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VIEWS, NEWS AND INTERVIEWS.

"They're telling this story up in New York State," said a traveler. "Rafferty was a conductor on an electric car. The superintendent caught him 'knocking down' fares and warned him to stop it. Rafferty kept on and was finally discharged. He brooded over his dismissal for a day or two and then loaded up on cheap whisky and started out to do up the superintendent. Rafferty found him in the car barn and began to complain that he had been unjustly discharged. One word led to another and pretty soon there was a fight. Rafferty ended it by drawing a revolver and shooting the superintendent. He was arrested for murder, tried, convicted and sentenced to electrocution. They took him to Sing Sing, sat him in the electric chair and turned on the current. It had no effect on him."

"Why?" asked the listener.

"Because Rafferty was a non-conductor."

According to a daily contemporary, underground wire ordinances in Philadelphia are constructed on the principle that you must first have the pole wire. Then you can bury it.

An important change is about to be made in the government printing office in Washington, where the whole of the heavy shafting and expensive belting hitherto employed will be removed to make room for an electric equipment. The office is to be entirely lighted by electricity, and it is estimated that this reform alone will save the government $1,200 a month in gas bills. Much of the machinery will be operated by electric power instead of steam, and nearly all the work of several of the departments will be done by electric motors.

A little girl met with an unusual accident at Union Hill, N. J., the other day. A gang of men were stretching feeder lines for the North Hudson County Railway. The workmen would throw the cable over the cross-arms of a number of poles and then attach a team of horses to the end of the cable and draw it taut. The little girl was hanging on to the slack cable when the horses were started off, and as the cable went up she went with it. The cable kept going up and the girl became too frightened to let go and hung on until she reached the cross-arm, when she let go and fell 30 feet to the ground. She was quite seriously hurt.

Over in Brooklyn, N. Y., when there is any work to be done on the trolley tracks at night now, the workmen hook on to the trolley wire a hanging wire with a bunch of incandescent lamps and a reflector at the lower end, says the New York *Sun*. With this arrangement the street is lighted up even better, in many places, than by the daylight that filters through the elevated structure. There is no limit to the number of lamps that may be used, and a great advantage is that the light can be reflected and concentrated exactly at the point where it is wanted, and moved about with perfect freedom. A maze of switches is now being laid near the bridge entrance and a dozen or more bunches of lamps hanging from trolley wires flood the street surface with light, while the reflectors prevent any glare from shining in windows and annoying people living in the neighborhood.

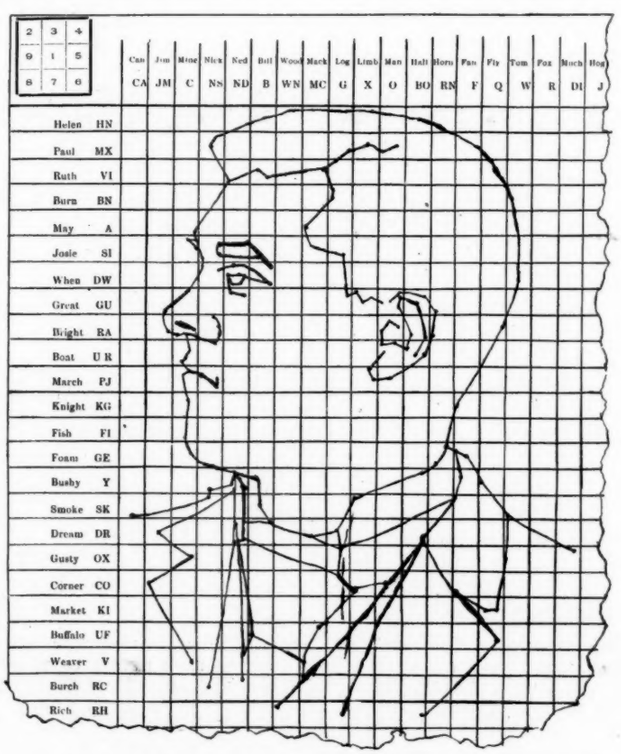


FIG. 1.—LOWD'S CIPHER CHART FOR SENDING PICTURES BY TELEGRAPH.

The Brush Electric Company, of Cleveland, has recently completed 24 of the new 125-light 2,000 candle-power dynamos for the Citizens' Electric Illuminating Company of Brooklyn, N. Y.

SENDING PICTURES BY TELEGRAPH.

MR. LOWD, OF DULUTH, DEVISES AN INTERESTING METHOD OF TRANSMISSION.

Mr. W. H. Lowd, train dispatcher for the Northern Pacific Railroad at Duluth, Minn., has copyrighted an interesting method of sending pictures by telegraph, which is illustrated and described herewith. Mr. Lowd has been a telegrapher for 12 years, nine of which he has spent with the Northern Pacific Company.

FIG. 2.—W. H. LOWD—DRAWING MADE FROM CHART SHOWN IN FIG. 1.

He is 28 years of age and hails from the northern part of Minnesota.

The method is a comparatively simple one and should prove of especial value to newspapers in obtaining a map of the scene of a crime, plans of buildings, navy and army manœuvres and, where telegraph tolls are not too high, portraits and other pictures.

The drawing or sketch which it is desired to transmit by telegraph is traced in an enlarged or reduced form, by means of a pantograph, on one of Mr. Lowd's cipher charts. A section of the chart is shown in the accompanying illustration, Fig. 1. This chart consists of a sheet of paper on which are ruled 476 blocks about a quarter of an inch square, which are each subdivided into nine lesser blocks and squares, numbered from

one to nine. Across the top and bottom of the chart are letters designating each of the larger blocks, and on either side are like designations of the blocks running across the sheet, similar to the methods employed in atlases for the location of points on maps. The letters are supplemented by short words which can be used instead. The words are preferable in long-distance messages for the simple reason that in frequent transfers they are not so apt to be wrongly sent. In indicating lines passing between the square the fraction is given by using the figures which the line divides, as thus, for instance: ⅔, ¾, ¼, etc. In sending curves each square is given through which the curve passes. Blocks to be shaded are named, as are also colors.

After the tracing is on the chart it will be found that each line or curve can be very closely located by the little squares and described by the cipher giving the two dimensions. The points described by the cipher are then sent by telegraph to the receiving end of the line. The operator there has a similar chart before him and follows with his pencil the points given in the telegraphic message. When the tracing is completed it is handed over to an artist, who fills in the sketch as required.

Fig. 2 is a portrait of Mr. Lowd drawn from the chart shown in Fig. 1. The cipher message from which the tracing on the receiving chart was made is as follows:

The word "From" denotes a new starting point. Keep the pencil on the paper until the word "From" appears again. When figures follow each other (as 1, 5, ½, etc.) they are the ones in the block last indicated by words. The word "To" is understood.

From Ruth Ned 8 "To" May mine 6 Josie Nick 8 when Nick 2 great mine 3 great Jim ⅛ bright Jim ⅛ bright mine 8 7 boat mine ¼ ⅞ March mine ¾ ⅓ knight mine ⅜ fish mine 7 foam mine ⅜ foam Nick ⅞ bushy Ned 3 ⅛ bushy Nick 7 smoke Nick 3 smoke can 7.

From bushy Ned 3 7 dream Jim 1 gusty mine 5 corner Jim 9 weaver mine 6.

From bushy Ned 7 dream Ned 7 burch Nick 1.

From dream Ned 3 burch Ned 4

From bushy Ned 3 6 dream Ned 6 ⅝ Buffalo Bill 9 weaver Ned 4.

From Buffalo Bill 9 weaver Mack 9 burch Mack 2.

From dream Ned 6 corner log 3 corner limb 8 Buffalo Mack 4 weaver Mack 9.

From dream Ned 4 dream Bill 4 dream Mack ¼ gusty log ¾ corner log 3.

From foam horn 4 ⅞ bushy hall 4 smoke limb 2 dream log 1 dream Mack ¼.

From smoke fan 2 gusty log ¾ dream log 1.

From foam fan ⅝ bushy fan ⅜ smoke fan 2 dream hall ⅝ rich wood 2.

From rich hall 5 buffalo fly ⅝ corner fan 8 dream hall ⅝ market man 8 rich log 5.

From foam horn 4 foam fan 1 bushy fly 9 smoke Tom 8 gusty much 2.

From smoke Tom 8 gusty Tom 9 market fly 5 ¼ corner fan 8.

From Ruth Ned 8 Paul Nick 1 ¾ Helen wood ¾ Helen limb ¾ Helen hall 1 Helen horn 7 Paul fan 5 Ruth fly 1 burn Tom 9 Josie Tom ¼ when Tom ¼ bright fly 5 knight fan 9 foam horn 4.

From March mine ¾ March Nick ⅝ 6 5.

From bright mine 7 6 boat Nick ¾ bright Nick 6 5 ¾.

From bright mine ⅝ ⅝.

From when Nick ⅛ when Ned ⅔ 4 when Bill 6 when Ned 5 9 ⅞ ⅛ 5.

From when Ned 9 great Ned ⅔ ⅛.

From Josie Bill ⅞ Josie Nick ⅝ ⅛ Josie Ned ⅛ when Bill 4.

From Ruth Ned 8 Ruth Bill ⅛ ⅙ Ruth Mack ⅛ Paul log ⅛ Paul limb 1 Paul man ⅝ ⅛.

From Ruth Mack ⅛ burn log 2 9 May Mack ⅜ Josie Mack ½ 5 Josie log ⅙ great log ⅛ great limb 2 1 ⅛ great man 9.

From great man 1 4 great hall 2 ⅛ great horn ⅞ bright horn 8 boat hall 5 March man 1 March limb 5 ¾ boat man 9.

From bright man 5 ⅓ ⅝ boat man 2 ¾ boat hall ⅜ bright hall ⅞ great man ⅝ ⅛ great hall 1 ⅝ bright hall 6 boat hall 1.

From bushy Ned 3 bushy Bill ½ smoke Bill 1 dream Bill 4.

From corner limb ⅝ corner man ⅛.

From Josie mine 5 3 4.

Hair cut close on back of head and neck. Hair parted and combed forward and up.

Old Time Telegraphers' Reunion.

Handsomely engraved invitations have been issued for the fifteenth annual reunion of the United States Military Telegraph Corps and Old Time Telegraphers' and Historical Association, to be held in New York city, September 11, 12 and 13. The headquarters of the meeting will be the Broadway Central Hotel, Broadway opposite Bond street. The programme of the meeting is as follows:

September 11, 10 A. M.—Business meeting of Old Time Telegrapher's and Historical Association. 2 P. M. —Business meeting, United States Military Telegraph Corps. 8 P. M.—Entertainment especially arranged for the occasion at Chickering Hall, Fifth avenue and Eighteenth street, New York.

September 12, 10 A. M. — Ocean excursion to Long Branch, N. J. 2 P. M.—Banquet at Long Branch.

September 13—General sight-seeing; "go as you please."

The invitations are fine examples of the engraver's and printer's art and are from the press of the well-known James Kempster Printing Company, of New York.

KIND WORDS.

FIN-DE-SIECLE.

TO THE EDITOR OF ELECTRICAL REVIEW:

Although I am an amateur, I find your paper keeps me up with the times.

Yours truly,
W. H. WILBER.

Carpentersville, Ill., August 7.

"Are you satisfied with your cable company investment?" was asked of John W. Mackay by a *Journal of Finance* reporter. "Ten times better than I expected," was the reply.

It is reported that an electric railway line from Providence, R. I., to Fall River and New Bedford, Mass., is in contemplation.

RESPIRATION, SUFFOCATION AND RESUSCITATION.

THE MAIN PHYSIOLOGICAL FACTORS WHICH PLAY THE RÔLE IN RESPIRATION, SUFFOCATION AND RESUSCITATION, AND THE AUTHOR'S METHOD OF PNEUMATIC ARTIFICIAL RESPIRATION.*

BY J. MOUNT BLEYER, M.D., F.R.A.M.S. (NAPLES, ITALY), OF NEW YORK CITY. ORIGINAL COMMUNICATION TO THE ACADEMIA DE CIENCIAS MEDICAS, FISICAS Y NATURALES DE LA HABANA, 1895.

Laryngologist to the German West-Side Clinic; Membre de la Societe Francaise de Otologie de Laryngologie et de Rhinologie, Paris; Member National Academy of Medicine, Mexico; Membre de la Societe Francaise D' Electrotherapie, Paris; Member of the American Medical Association, etc.

The above factors mark an era in the progress of artificial methods of respiration at our disposal. We have a number of different modes each having its special feature recommending it, and bearing the names of such men as Sylvester Hall, Fells, Laborde and a few others. All these are generally known, so no recapitulation of them need be given. In this paper I give the world a new and original method which is here explained and is destined to bear my name.

The pneumatic artificial method of respiration is founded on the physiological principle of establishing a rythmatical breathing, which is carried out by means of, viz.: 1. Tubing the glottis. 2. Connecting the tube with an air tank filled up either with nature's diluted oxygen (plain atmospheric air), oxygen gas, or with a bellows if either is not at hand. 3. The expiration is performed by allowing the expired gases to flow off by a special valvular opening, working automatically as the rythm of respiration occurs. 4. Air is forced into the lungs by the different graded pressures contained in the receivers and controlled by a special pressure controller. 5. Forced respiration and expiration is under perfect command of the operator. 6. The method can be put into action in a few seconds of time and continued without detriment to the partially electrified, drowned, suffocated, etc., for hours at a time. 7. Any one with small amount of intelligence can perform the operation.

Giving this outline of explanations of what is to follow in detail, one can at once form his own opinion of the importance of a complete physiological method of breathing by proxy for a subject that received a non-lethal accidental dose of electricity, or became asphyxiated from gas, drowning, opium poisoning, ether, chloroform and many other causes where the main treatment remains the keeping up of suspended respiration.

This method of carrying out rythmatical breathing by means of catheters and rubber tubing has been employed by me since 1888 in connection with operative work about the larynx, mouth and nose. A report of these proceedings was read before the American Medical Association, section laryngology, June, 1890: "The Value of Intubation of the Larynx in Connection with Other Operations, Etc." In May, 1893, by this method, with Dr. M. M. Weill, I saved the lives of three persons from illuminating gas after 13 hours' exposure. The *Therapist* for November, 1893, contains a description of the procedure at that time and clinical notes of these cases.

* The apparatus is made for me by George Ermold, surgical instrument maker, New York.

Since then the apparatus has evoluted from several models of mine into a more complete mechanical construction, of which the cut opposite is a correct illustration.

As others have trespassed on my method and mechanical construction of this tube without giving me credit for the same, I am forced, openly, to claim my priority for all methods of artificial respiration in which the glottis is tubed for the purpose of resuscitating individuals after that state. Several have since then laid claim to similar apparatus, when practically they were planned on tubing the glottis. I find that Dr. O'Dwyer has followed me also by one designed on principles of my own and calls it *artificial* forcible respiration, which bears his name, but under the above claim and dates I am the first to have made the use of tubing of the glottis for carrying out direct artificial respiration in asphyxiation, from whatever cause.

Leaving all this to be judged by my peers regarding the equity of my claims and value of my method added to those already in vogue, I go on with the subject matter before me.

From the general outline of this apparatus, which is seen photographed in position and in detail, a good idea can be formed regarding the working and its accessories. The points of procedure in performing artificial respiration by this method are in short as follows: Any one who has ever performed the passing of an intubation tube or the passing of an œsophogeal sound or feeding tube can without difficulty pass the instrument into the vault of the larynx. The main features to be kept in mind are these: The patient is made comfortable on a flat table or floor, and all dress apparel about neck, chest and abdomen must be removed. The head is placed into a narcosis position and kept in that way as long as the operation is being carried out. Sometimes it is well to pass the tube in a sitting posture until it is piloted into the larynx. This choice of position remains as choice to the operator. When once the apparatus has reached the larynx, as it is nearly at right angles with the chest, keep the head extended during artificial respiration and the body recumbent. Once the tube passed it can be most easily controlled throughout without any difficulty for hours. The entire apparatus is made ready by attaching the tubing to the air tank, and from thence to the tube handle or bellows in a moment. All attachments are arranged with bayonet joints. A gage is placed in the angle of the mouth. The special size tube can be selected according to age and size of larynx. The expiratory valve must remain open while tubation is being performed until it is passed, then closed by lifting the finger off and the air allowed to pass through the inspiratory valve. When all is done a perfect rhythm of expiration and inspiration can be performed according to the will of the operator.

Once all connections are made from cylinder to tube, or from bellows to tube, time does not play any rôle. Hours can be given to it without tiring the operator. After once the respirations are started, make the rhythms from 10 to 15 per minute. This should be continued until patient begins to show physiological efforts.

The tubes are so appointed that they allow no inspiratory or expiratory air to pass out between any space in the larynx or vault while in position. They assume a shape to fill up the entire larynx. This is important, so that air flows directly into the lungs and is there diffused and taken up by the tubes, air cells, etc. The handle to which the tube is attached must

always remain in the hands of the operator, and so controlled by him according to his judgment. The right hand controls the handle and tube, and the left the valve from the air tank. Both hands are made to act in exact rhythm and time of inspiration and expiration.

The life-saving value of artificial respiration cannot be doubted for a moment by any one well informed upon its teeming literature and in the practice of medicine. This has been demonstrated to us on many an occasion. If we picture some of the thousands of narratives which have been printed in our dailies, saying nothing of those in medical reports of the varying cases that we have been confronted with, we would be amply repaid for the struggle we undertook in saving souls from going to an untimely and perhaps a regretted end.

Such accidental and intentional suicides we are brought face to face with daily, in which artificial respiration is the only remedy which must and can be employed to stay the last sparks of an ebbing life. In those who have gone beyond the pale of human sagacity, we know who has thus suddenly arrested the wondrous mechanism, and in the place of palpitating, vigorous beings, leaves them silent corpses. The cause seems so trifling that we can only marvel at its importance when revealed in the effect; it is the same in all such cases, in spite of the difference of the means, that which kills one kills the other; the fumes of gas, the opium, the rushing waters, accidental contact with electrical currents, of which a few cases are recorded which have survived when artificial respiration was resorted to, and such same means interrupted the exchange of a small quantity of gases, and by preventing the blood from getting rid of its carbonic acid, in exchange for an equivalent of oxygen, the fervid wheels of life were suddenly arrested. It is the same cause acting with milder force which makes the faces pale of those who issue from a crowded church, and gives a languor to those who have sat for some hours in a theater, concert room and any other ill-ventilated apartment, in which human beings have been exhaling carbonic acid and other material from their lungs. A breath of fresh air quickly restores them, and after breathing this fresh air during a walk home they scarcely feel any evil results of the late partial suffocation. So, if in certain of those accidental and intentional cases artificial respiration could be employed in time, the chances for recovery would have been in their favor, as our concert-goers are restored by the first few whiffs of nature's diluted oxygen.

Among the earliest experiences of mankind must have been the necessity of fresh air for the continuance of life; but the complete explanation of the fact, in all its details, is a scientific problem, the solution of which only began to be possible when Priestley discovered the gases of which the air is composed and the relation these bear to the organism. Nor is the problem even now entirely solved, in spite of the labors of so many illustrious men. We have learned much, and learned it accurately, but the difficulties which still baffle us are many and considerable. The ancients really knew nothing of this subject, nor did the men of the sixteenth and seventeenth centuries lay any solid foundation stone. That was laid by Priestley when he discovered the oxygen contained in atmospheric air to possess the property of converting venous into arterial blood. Lavoisier carried out this discovery, and founded the chemical theory of respiration. Goodwyn (1788) applied the new views to asphyxia, showing by a series of experiments that when air was excluded venous blood remained unchanged, and when it remained unchanged death inevitably followed. Bichat instituted a number of striking experiments to prove that an intimate relation existed between respiration, circulation and nervous action. He showed how access of venous blood to the brain stopped its action, and subsequently stopped the action of the heart. Legallois extended these observations to the spinal chord. But by far the most brilliant investigations on the subject of respiration are those of Spallanzani, whose memoirs still deserve a careful study, both as models of scientific research and as storehouses of valuable facts. He was succeeded by W. F. Edwards, whose Influence des Agens Physiques sur la Vie remains one of science's monuments, and of which it can boast as one of its best works. During the present century hundreds of physiologists have devoted labor to the elucidation of the various difficulties which darken this subject, and a vast accession of valuable facts has been cleared up which we may now endeavor to exhibit.*

And, first, let us ask, what is respiration? A question which many may regard as idle; yet, until it is answered in something like a definite manner, we shall find our inquiries constantly obstructed. Reduced to its simplest elements, respiration appears to be nothing more than the interchange between the blood and the atmosphere of carbonic acid and oxygen (how much the new element, argon, has to do with it is still a question to be thought out). But, although this is the simple formula to which analysis of the process conducts us, we shall be led into important errors if we see in it the whole of the process. It is the physical fact upon which the vital process depends, but it is not the vital function itself. This interchange is effected by every tissue, even when separated from the organism.

They all absorb oxygen in its diluted and compound state, and exhale carbonic acid. A fragment of muscle, so long as it retains its irritability, is found to absorb oxygen from the air and to exhale carbonic acid; but we do not call such interchange respiration, because respiration is something more than a mere exchange of gases; it is an animal function, which, although dependent on the physical laws of gaseous interchange, derives its special character from the organism in which it is effected. In the course of an inquiry we shall have occasion to observe how the neglect of the distinction now insisted on between respiration as the function of an apparatus of organs, the respiration as the mere interchange of gases, determined by physical laws, has led to error; for the present, it is enough to have drawn attention to the true physiological conception. In the higher animals we see this function performed by two different organs—gills and lungs. In both organs we find that a large quantity of blood is exposed to the air by means of a network of vessels spread over the surface. The blood curves these back and passes away scarlet. It has exchanged some of its carbonic acid for some of the oxygen of the air; it has become changed from venous into arterial blood. This oxygenation of the blood is, therefore, the special office of respiration; and although all animals exhale carbonic acid and absorb oxygen, although every tissue does so, yet we must vigorously limit the idea of respiration, as an animal function, to that which takes place in the gills or lungs. True it is, that the simple animals effect such exhalation and absorption by their *general surface*, and not by any *special modification of it*, such as gills or lungs; true it is, that even fish and reptiles, furnished with gills, also respire by their skin; and that when the lungs of a frog are removed, the necessary oxygenation of the blood may be effected through the skin, if the temperature be low; nay, it is also true, that even man himself, in a slight degree, respires by the skin, one-fiftieth to one-fortieth part of the entire function, so that the tracing spreads the gradual complication of the organic apparatus, and finding *first*, the whole of the general surface effecting the aeration needed; secondly, a part of the surface formed into a gill, in which aeration is far more active, and, finally, finding this gill replaced by a lung, we may be tempted to say: "If the aeration of the blood is the office of respiration, and if this is effected in some animals by the skin alone, in others by the skin and the lungs, but still in a slight degree also by the skin, how can it be pretended to establish a distinction, other than by a simple distinction of degree? How can it be expected to lay much stress on a verbal difference such as that between function and general property or tissue?"

FIG. 2.—AIR CYLINDER FOR HOLDING COMPRESSED AIR.

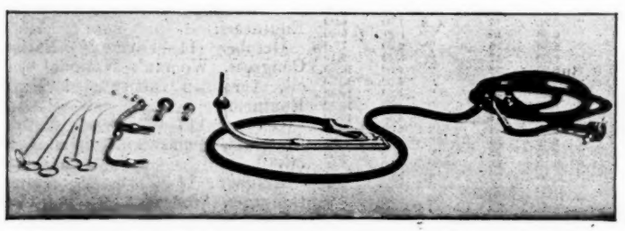


FIG. 1.—Dr. Bleyer's Pneumatic Resuscitation Apparatus. On the left Pillots and Glottic Tubes of various sizes. On the right Connecting Tube, and a tube ready fitted on the handle which contains the valves for forcible inspiration and expiration.

In reply to this plausible objection we must observe that in science verbal distinctions are often extremely important; they keep attention alive to real though subtle distinctions. It is difficult to keep to such distinctions, for, as Bacon says, "words are generally framed and applied according to the conception of the vulgar, and draw lines of separation according to such differences as the vulgar can follow; and when a more acute intellect or a more diligent observation tries to introduce a better distinction, words rebel." In strict physiological language, no animal without blood ought to be said to breathe, for respiration in such animals is not effected by a special apparatus of breathing organs, and in physiology the idea of function is inseparably connected with that of organ. Professor Berard says that, penetrated with the idea of a special organ being necessary for respiration, he experienced a singular disappointment in reading the experiments of Spallanzani, which proved that every tissue of the body absorbed oxygen and gave out carbonic acid; and he "only recovered his contentment on perceiving that the essence of respiration consisted in this interchange of gases, so that, whatever nutritive fluid was in contact with the atmosphere, respiration must take place." Here the professor seems to have made an oversight, confounding the general with the particular, as completely as if a savage visiting a civilized country, and observing the transport of men and goods by railways, and "penetrated with the idea of a special method of transit being necessary," were afterwards to observe that vans, carts and wheelbarrows also conveyed goods, from which he would conclude that the essence of transport being the removal of goods from one place to another, every means of transport must be a railway. The interchange of gases, like the transport of goods, may be effected by various means, but we only call the one respiration when it is effected by gills or lungs and the other railway transit when it is effected by railways. Professor Berard was right in conceiving that a special organ was necessary for respiration, and his error arose from confounding the action of the organ with the result of that action. Respiration effects the interchange of gases and the aeration of the blood by means of a peculiar organic apparatus, without which the due aeration would not take place in the higher animals. In the simpler animals this apparatus is not needed, because the nutritive fluid, being easily accessible, requires no function to bring it into contact with the air; but no sooner does the organism become so complex that a direct aeration of the nutritive fluid ceases to be possible than an apparatus is constructed, the function of which is to effect this aeration. In the gills and lungs we see such an apparatus. Unless distinctions like these are established, respiration ceases altogether to be a vital process, and every interchange of carbonic acid and oxygen, no matter where effected, will have an equal claim to be designated as a respiratory act. Therefore, as it is of the first importance in all physiological inquiries to keep constantly in view the part played by the organism in modifying physical laws, the philosophic reader will see at once that any verbal distinction which aids us in this must be of advantage. We should, perhaps, do well to indicate the special distinctions by using phrases such as "pulmonary respiration," "bronchial respiration" and "cutaneous respiration" for the various classes of animals.

(To be continued.)

*In the following works will be found most of the facts cited or alluded to in this exposition: Spallanzani: Memoires sur la Respiration; Edward's: De l'Influence des Agens Physiques sur la Vie; Claude Bernard: Le cons sur les Effects des Substances Toxiques; Milne Edwards: Le cons sur la Phys. et l'Anat. Comp Lehman's Physiologische Chamie, and the Treatises on Physiology of Berard, Muller, Funke, Draper, etc.

Worth Repeating—Electrical.

No insulator of magnetism is known.

One ampere will deposit 18.35 grains of copper in one hour.

The pull of a magnet is increased by reducing its polar surface.

Electro-magnets with long limbs are practically no better than those with short limbs for sticking on to masses of iron.

It is said that electric lamps run by storage batteries last twice as long as lamps operated directly from dynamos.

Any galvanometer having a resistance which is large in proportion to the current to be measured can be used as a voltmeter after calibration.

In making a spark coil, or, in fact, any electrical apparatus, the main requirements necessary for success are patience and determination to construct each part thoroughly.

The strength of the solution in each cell of storage battery should be tested with a hydrometer once a month. When the battery is fully charged, it should indicate 22 degrees Baume.

In an arc lamp, supplied with a direct current, the consumption of the positive carbon is, in round numbers, one inch per hour and of the negative carbon one-half that amount.

Aluminum has the least electrical resistance for a given length and weight and mercury has the greatest; but for a given length and sectional area, annealed silver has the least resistance and bismuth the greatest.

Before beginning to charge a storage battery, it should be gone over carefully, and any cell that is not up to the standard should be taken out of the circuit and put in working condition before being replaced.

S. P. Thompson says: "You will get the given amount of magnetism and traction, with the least amount of magnetizing force, when you have the area (of the magnet) as great as possible and the length as small as possible."

In the construction of a voltmeter, it is usual to allow a resistance of 50 ohms for every volt to be measured. This gives sufficient accuracy for most purposes, as the error is within three per cent of the total readings.

According to Thompson, a thin, round disk of iron, laid upon the flat, round end of an electro-magnet (the pole end being slightly larger than the disk), the disk is not attracted, and will not stick on even if laid down quite centrally.

In all quick-acting electro-magnets and in magnets for alternating currents, the core should be laminated to prevent eddy currents. Sometimes, however, when the alternations or pulsations are not very rapid, the eddy currents are prevented, by making the core tubular and slitting it through lengthwise on one side.

Joule made an electro-magnet having an iron core one-twenty-fifth of an inch in diameter and one-quarter of an inch long, bent into the shape of a semi-circle, and wound with three turns of uninsulated copper wire, one-fortieth of an inch in diameter. It weighed one-half grain and carried 1,417 grains, which was 2,834 times its own weight.

The cotton thread used for the filaments of incandescent lamps is parchmentized before carbonization, by passing it slowly through a solution of sulphuric acid two parts, water one part, and finally washing it in water until every particle of the acid is removed. The parchmentized thread, after drying, is reduced to a uniform diameter by drawing it through dies, after the manner of wire drawing.

A thermopile for experimental purposes may be made of pieces of German silver and copper wire, twisted and hard-soldered at the ends, forming series of pairs and arranging the wires thus joined in the form of a many-pointed star, so that the German silver and copper wires alternate, the ends of the series being left unconnected. The inner points of the star are heated over a kerosene lamp. The wires may be No. 16 and six inches long.—*Scientific American.*

MOONLIGHT SCHEDULE FOR THE UNITED STATES.

[*Issued by the National Carbon Company.*]

SEPTEMBER, 1895.

Day of Mo.	Light.	Day of Mo.	Extinguish.	No. of Hours.
	H.M.		H.M.	H.M.
1	A. M. 12.40	1	A. M. 4.30	3.50
2	" 1.40	2	" 4.30	2.50
3	" 2.30	3	" 4.30	2.00
4	No light.	4	No light.	....
5	No light.	5	No light.	....
6	No light.	6	No light.	....
7	P. M. 6.40	7	P. M. 8.40	2.00
8	" 6.40	8	" 9.21	2.40
9	" 6.40	9	" 9.40	3.00
10	" 6.40	10	" 10.20	3.40
11	" 6.40	11	" 11.00	4.20
12	" 6.40	12	" 12.00	5.20
13	" 6.30	14	A. M. 1.00	6.30
14	" 6.30	15	" 1.10	6.40
15	" 6.30	16	" 2.30	7.50
16	" 6.30	17	" 3.40	9.10
17	" 6.20	18	" 4.50	10.30
18	" 6.20	19	" 4.50	10.30
19	" 6.20	20	" 4.50	10 30
20	" 6.20	21	" 4.50	10.30
21	" 6.20	22	" 4.50	10.30
22	" 6.20	23	" 4.50	10.30
23	" 6.20	24	" 4.50	10.30
24	" 8.00	25	" 5.00	9.00
25	" 9.10	26	" 5.00	7.50
26	" 10.30	27	" 5.00	6.30
27	" 11.00	28	" 5.00	6.00
28	" 11.30	29	" 5.00	6.30
29	....	30	" 5.00	4.30
30	A. M. 12.40	..	....	
	Total			172.30

Fare Registers on the Nantasket Beach Line.

The Nantasket Beach line of the N. Y., N. H. & H. R. R., which was recently electrically equipped, has provided its cars with New Haven fare registers made by the New Haven Car Register Company, of New Haven, Conn. These registers were adopted after a thorough test of the leading machines on the market and the railroad officials are said to be highly pleased with their investment. The demand for these registers is constantly on the increase and the New Haven Car Register Company has recently equipped, among others, the Fitchburg & Leominster Street Railway, Fitchburg, Mass., the Atlantic Coast Line, Asbury Park, N. J., and the Glens Falls, Sandy Hill & Fort Edward Street Railway.

The Lynn & Boston and the Gloucester, Essex & Beverly Street Railway tracks were connected on August 14.

The Cotton States Exposition.

OPENING WEDNESDAY, SEPTEMBER 18

—SPECIAL DAYS.

The list of special days at the Cotton States and International Exposition is being rapidly completed. All organizations of national reputation, and having wide membership, have been invited to come to Atlanta to visit the Exposition in the Fall, and are requested to communicate with the Exposition authorities in reference to special days. Following is a list of the days that have so far been decided on:

September 18 — Opening Day. Liberty Bell Day.

September 19—Georgia Editors' Day.

September 25—Kentucky Press Association.

September 28 — New England Woman's Press Association.

October 1—Missouri Press Association, Southern Mining Convention, Texas Press Association.

October 2—Georgia Bar Association, South Carolina Press Association, Southern Mining Convention.

October 3—Georgia Bar Association, South Carolina Press Association.

October 4—Georgia Bar Association, South Carolina Press Association.

October 5 —Tennessee day.

October 7—National Irrigation Congress, North Carolina Day.

October 8 — National Irrigation Congress, American Institute Mining Engineers.

October 9—Chicago Day, National Irrigation Congress, American Institute of Mining Engineers.

October 10—Farmers' National Congress. Women's National Council, American Institute of Mining Engineers.

October 11—Farmers' National Congress, Woman's National Council, American Institute of Mining Engineers.

October 12—Farmers' National Congress, Women's National Council.

October 14—Farmers' National Congress, Women's National Council.

October 15—Farmers' National Congress, Women's National Council.

October 16—Farmers' National Congress, Women's National Council, Bankers' Association of America.

October 17—Road Parliament, Women's National Council.

October 18—Commercial Travelers' Day, Daughters of Revolution, Road Parliament.

October 19—Virginia Day, Orator, General Daniel; Daughters of Revolution.

October 21—Connecticut Day, Seidl's Orchestra.

October 22—Georgia Association of Manufacturers, Seidl's Orchestra, World's Fair Lady Managers.

October 23—President's Day, Seidl's Orchestra.

October 24—City of Washington Day, Women's National Press Association, International League of Press Clubs.

October 25—South and West Trade and Grain Congress, Seidl's Orchestra.

October 26—Educational Congress, Seidl's Orchestra.

October 27—Pennsylvania Day.

October 28—Educational Congress, Plant System.

October 29—Educational Congress.

October 30—Wesleyan Female College, Educational Congress, National Association Household Economics.

October 31—Educational Congress, National Association Household Economics.

November 1—Educational Congress, Louisiana Day, Women's Federation of Clubs.

November 2—Women's Federation of Clubs, Women's Educational Congress.

November 5—Women's Christian Temperance Union.

November 7—Daughters of Confederacy, Southern Female College, Pennsylvania Day.

November 8—Peabody Normal.

November 9—Delaware Day.

November 11—Association for Advancement of Women.

November 12—Georgia Day, Women's Press Clubs, Grady Day, Georgia Editorial Day.

November 13—Women's Press Clubs, International League.

November 16—Kentucky Day.

November 20—Letter Carriers' Day.

November 21—Connecticut Day.

November 28—South Carolina Day, Library Day.

November 29—Lucy Cobb Day, Library Day.

December 3—National Brickmakers' Association.

December 4—National Brickmakers' Association.

December 5—National Brickmakers' Association.

December 6—Rhode Island Day.

December 10—Woodmen of the World.

December 11—Woodmen of the World.

December 28—International Folk Lore Association.

December 29—International Folk Lore Association.

Native Modesty.

[*From the Chicago Tribune.*]

They had a new girl. She was not the imported article, but was nativistic enough to satisfy a member of the A. P. A. She came from somewhere in Indiana and had never seen a telephone. She was given a hasty lesson in its use, and was told to answer it when members of the family were absent. The second afternoon everybody was out but the Indiana product. She was in her room.

An hour before dinner the female head of the family returned.

"That thing in the closet was ringing for 10 minutes this afternoon, ma'am," said the new girl.

"Why did you not answer it, as I told you to do, Mary?" said the mistress.

"I would have, ma'am," said Mary, "only I was half undressed, and I was afraid it might be a man."

Incandescent Filament vs. Welsbach Mantle.

According to Von Oechelhäuser, says the *Gas World*, a Welsbach lamp gives one candle for every 33 square millimetres of its area. According to Bernstein, an electric glow-lamp filament gives off the same for each four square millimetres.

The Ticonderoga Telephone Company, Ticonderoga, N. Y., have contracted with the Western Telephone Construction Company, Chicago, for apparatus to equip a telephone exchange for that city. They have also arranged for toll lines connecting towns along Lake George and Lake Champlain.

ASSOCIATION OF EDISON ILLUMINATING COMPANIES.

ELEVENTH ANNUAL MEETING HELD AT DETROIT LAST WEEK.

The eleventh annual meeting of the sixteenth convention of the Association of Edison Illuminating Companies was held in Detroit August 13, 14 and 15, 1895. The first session of the convention was called to order August 13 at 10 A. M., by C. L. Edgar, president. The order of the session was as follows:

Roll call—Those present were J. W. Leib, Jr., assistant general manager Edison Illuminating Company, New York; W. S. Thompson, inspector Detroit Edison Company, Detroit, Mich.; John I. Beggs, vice-president and general manager Cincinnati Edison Electric Company; George A. Redman, general superintendent Rochester Gas and Electric Company. Rochester; Adolph Muller, Hagen, Germany; E. M. Clark, meter department Detroit Edison Company; W. S. Barstow, general superintendent Edison Electric Illuminating Company, Brooklyn, N. Y.; George Wiley, Detroit Edison Company; Daniel McCoy, president Edison Lighting Company, Grand Rapids, Mich.; George W. Cato, electrician Detroit Edison Company; A. F. Walker, superintendent Edison Electric Company, Grand Rapids, Mich.; Samuel Scovil, vice-president Cleveland Electric Illuminating Company, Cleveland, O.; Wingfiend S. Jewell, general manager Toledo Electric Company; George Peck, president Detroit Edison Company; Hoyt Post, attorney Detroit Company; C. L. Edgar, vice-president and general manager Edison Illuminating Company, Boston; Arthur Williams, general inspector Edison Electric Illuminating Company, New York; B. E. Sunny, General Electric Company, Chicago, Ill.; J. R. Lovejoy, General Electric Company, Schenectady, N. Y.; Luth r Stieringer, New York; Robert Lindsay, general superintendent Cleveland Electric Illuminating Company; S. D. Greene, general manager lighting department General Electric Company; H. T. Edgar, general manager Edison Illuminating Company. Atlanta, Ga.; A. D. Page, General Electric Company; C. P. Gilbert, general manager Detroit Edison Company; Caryl D. Haskins, meter department General Electric Company; J. S. Crider, Edison Electric Illuminating Company, Cumberland, Md.; Samuel Insull, president Chicago Edison Company, Chicago, Ill.; F. Sargent, consulting engineer Chicago Edison Company; W. S. Andrews, General Electric Company; M. A. Beal, secretary and treasurer Forest Electric Light and Power Company, Rockford; Edwin R. Weeks, general manager Edison Electric Light and Power Company, Kansas City; Charles R. Price, treasurer New Bedford Gas and Electric Light Company; A. W. Field, secretary and manager Columbus Edison Electric Light Company; George R. Stetson, president New Bedford Gas and Electric Light Company.

After the roll call the executive committee, represented by its chairman, Mr. John I. Beggs, made a report recommending the acceptance of the application of three companies for admission, *i. e.*, Edison Light and Power Company, Pottsville, Pa.; the Toledo Electric Company, Toledo, Ohio; the Sault Ste. Marie Company, Sault Ste. Marie. These were admitted.

A report by Mr. A. E. Kennelly (for committee on lightning protection, grounding the neutral in three-wire systems, cross with high tension systems). This report was accepted and the committee was discharged. Addresses were then made by S. D. Green, of the General Electric Company, Mr. Insull, of Chicago, and Mr. Beggs, of Cincinnati, on "The Relations of the General Electric Company to Edison Licensee Companies."

After considerable discussion, Mr. W. L. R. Emmett, of the General Electric Company, was called upon for a paper entitled "Some Comparisons between the Direct Current Low Tension System and the Alternating Current and Multiphase System for Central Station Lighting." Mr. Emmett was unavoidably absent and his paper was ordered printed in the minutes. The session then adjourned.

The second session was held at 2 P. M., and the Storage Battery Committee made its report. A discussion followed. Mr. Muller, of Hagen, Germany; Mr. C. L. Edgar and Mr. J. W. Leib, Jr., gave their experiences. A paper by Messrs. Pierce & Hale was then read by Mr. C. L. Edgar, of Boston. The title of the paper was "Energy Losses in the Boston Edison Station." After discussion on this paper, the session adjourned. The evening was given up to a car ride and visit to Lalla Rookh, by courtesy of the Detroit Edison Company.

The third session was called to order at 10 A. M. on August 14. A paper by Mr. W. S. Barstow on "Method of Charging for Current for Incandescent Lamps and Motors" provoked much discussion, and with Mr. Arthur Williams's paper, "Relation of Company to Customer," occupied the entire morning. The session adjourned at 1 P. M.

The fourth session opened with a discussion by Mr. Beggs, Mr. Green and Mr. Howell, on incandescent lamps, Welsbach light and acetelyne gas.

A paper by Mr. C. D. Haskins on "Facts in Relation to Mechanical Recording and Chemical Meters" was then read and discussion followed. The evening was taken up by a drive and lunch on Belle Isle by the courtesy of the Detroit Edison Company and the General Electric Company.

In accordance with past custom, the last day of the convention, August 15, was given up to entertainment. This took the form of a delightful sail along the river at the invitation of the Detroit Edison Company who, together with the General Electric Company, received the thanks of the convention for their many courtesies.

The meetings of this convention were particularly interesting on account of the lengthy and interesting discussions on the various papers.

Mr. Edison sent regrets for his inability to attend, as he was unable to leave his mining interests at Edison, N. J.

The General Electric Company presented each member of the association with a handsome badge representing the fields of a multipolar generator from the center of which hung a miniature incandescent lamp. The title of the association, the place of meeting and the date were neatly arranged around the field.

Among the electrical supply men present were Messrs. Little, of the Interior Conduit & Insulation Company, McKinlock, of the Central Electric Company, and Miles, of the National Carbon Company.

The next convention will be held in, or in the vicinity of, Brooklyn, commencing the second Tuesday in August, 1896, and continuing three days.

AMERICAN ELECTRICAL WORKS' CLAMBAKE.

CELEBRATION OF THE COMPANY'S TWENTY-FIFTH ANNIVERSARY.

The American Electrical Works held their usual mid-Summer carnival, the event which holds so much of interest and is looked forward to so eagerly by the electrical fraternity, on Saturday, the 17th, at Haute Rieve, Providence, R. I., and it is hardly necessary to say that the success which has attended the numerous occasions of the kind in the past was very much in evidence.

Particular interest attached to this last gathering from the fact that, aside from its being the 17th annual bake, it marked the anniversary of the first quarter century of the company's existence, and their many friends turned out in hearty style to do them honor.

The weather conditions, as usual, were all that could be desired, and the sports of all kinds were well patronized. Baseball, football, hammer-swinging, rifle-shooting and quoits all had their admirers, and while the results of these various contests were eminently satisfactory at the time, it is probable that the after effects will keep them green in the memory (or the muscles) of the participants for some time to come.

The spectacle of sedate and dignified men of business, gray-bearded, bald-headed and corpulent, chasing a football with all the impetuosity and twice the perspiration of their boyhood days, is one that can be fully enjoyed on an occasion of this kind, and demonstrates how heartily all participated in the spirit of the gathering.

After enjoying the various sports to the full and incidentally working up a tremendous appetite, the guests, to the number of nearly 200, were grouped for a photograph, and the event of '95 being thus perpetuated, the welcome summons to dinner was obeyed with alacrity. As soon as the guests were seated neat little souvenirs were distributed, and following this ceremony for the next hour full justice was done to the excellent feast spread before the hungry visitors. This important part of the programme being disposed of and cigars lighted, President Phillips rapped for order, and after extending a cordial welcome to all present, alluded in a few touching sentences to the friends who in years past had graced his board on such occasions, but who had now joined the great majority. At his request a toast to the memories of departed friends was drunk standing and in silence.

Many letters from those unable to be present were received, all tendering their congratulations to the genial host, and regretting their enforced absence.

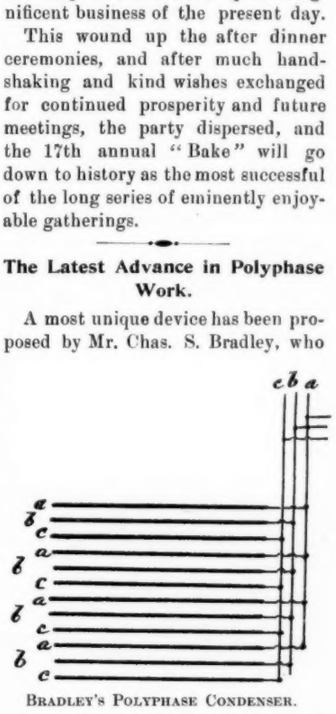
Mr. Thos. D. Lockwood, of the Bell Telephone Company, Boston, being appointed toastmaster, proceeded to call upon the following gentlemen, who responded gracefully: Mr. Ralph W. Pope answered to the toast of "Telegraphy," Mr. Lockwood to "The Telephone," and the toast "The Electrical Press" was responded to by Mr. W. S. Key, the senior among the newspaper men present. Mr. Key handled the subject in his usual happy vein, and wound up his address by a warm tribute to Mr. Phillips and the American Electrical Works.

"The Electrical Transmission of Power" was replied to by Mr. C. S. Sergant, general manager of the West End Road, of Boston, who related many funny stories of the relations between his company and the public. Captain Brophy responded to the toast, "Electric Light," and Mr. Eugene Phillips, after considerable coaxing, spoke briefly about his early struggles and thanked his friends everywhere who, through 25 years, had helped him to build up the magnificent business of the present day.

This wound up the after dinner ceremonies, and after much handshaking and kind wishes exchanged for continued prosperity and future meetings, the party dispersed, and the 17th annual "Bake" will go down to history as the most successful of the long series of eminently enjoyable gatherings.

The Latest Advance in Polyphase Work.

A most unique device has been proposed by Mr. Chas. S. Bradley, who



BRADLEY'S POLYPHASE CONDENSER.

has done more original work in the polyphase art than perhaps any other inventor. Mr. Bradley has found that the plates of a condenser may be arranged for connection with three or more mains of a polyphase system and will interact with the same in a manner somewhat analogous to the interaction of the several phases in a rotary magnetic field, except that the continuous sweep of maxima and minima is electrostatic instead of electro-magnetic in character. The organization is shown in the accompanying engraving; the several plates of the condenser are connected in consecutive order with the mains, the pressures of the different mains thus being interleaved; the three leads are connected in parallel with any translating device. The great advantage resulting from the employment of condensers with polyphase motors is the prevention of lag and so-called false currents. In Bradley's organization a single condenser organization does the same work as requires three independent condensers in the present practice, and the total number of plates needed is much less, thus reducing the amount of material required to about one-half, and offering the great commercial advantage of having but a single organization to deal with.

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SPECIAL NOTICE TO ADVERTISERS.

***CHANGES** for advertisements must be in this office by Friday noon for the following week's issue.*

***NEW ADVERTISEMENTS** should be in the office not later than Saturday noon to insure publication the following week.*

NEW YORK, AUG. 21, 1895.

CONTENTS.

	PAGE
Views, News and Interviews	99
Sending Pictures by Telegraph	99
Old Time Telegraphers' Reunion	100
Kind Words	100
Respiration, Suffocation and Resuscitation	100
Worth Repeating—Electrical	102
Moonlight Schedule for the United States	102
Fare Registers on the Nantasket Beach Line	102
The Cotton States Exposition	102
Native Modesty	102
Incandescent Filament vs. Welsbach Mantle	102
Association of Edison Illuminating Companies	103
American Electrical Works' Clambake	103
The Latest Advance in Polyphase Work	103
Wall Street and the Electrical Stock Market	104
Bribe Taking and Giving	105
A Balloon Electric Sign	105
Telephone News and Comment	106
Boston Duck Company's Electrical Installation	106
Personal	106
A Nice Arc Lamp Order	106
Electricity in Powder Mills	106
Montreal Street Railway Convention	106
Electrical Exhibits at the Cotton States and International Exposition	107
Street Railway Association of the State of New York	107
The Use of Two or Three Motors on Electric Cars or Locomotives	107
The Holden Magnetic Clutch	107
Wagner Company Sued for Infringement	107
Electric Street Lighting	108
General Electric Company to Stay in Schenectady	108
Westinghouse—General Electric	108
Westinghouse-Baldwin Alliance to Have a Competitor	108
Hints on the Maintenance of Electric Railway Cars	109
Literary	109
Electrical Patents	110
The Capacity of Electrolytic Condensers	111
Wanted—Capital to Develop a Water-Power	111
Bicycle Headlight	111
Cutter Electrical and Manufacturing Company Assigns	111
Kindred Interests	xii
Special Announcement	xii

INDEX OF ADVERTISERS.

COVER PAGES.

	PAGE
Abendroth & Root Mfg. Co., boilers	xviii
American Electrical Works, insulated wire	i
Armington & Sims, engines	xviii
Boudreaux Dynamo Brush Co., a new foliated anti-friction metal brush	i
Bunnell & Co., J. H., dry batteries	i
Columbia Incandescent Lamp Co	i, ix
Day's Kerite, insulated wire	i, x
General Electric Co., Edison lamp test	ii
Goubert Manufacturing Co., heaters	xviii
Greeley, E. S., & Co., electrical supplies	xviii
Hampson, E. P. & Co., engines	xviii
Interior Conduit and Insulation Co., Lundell dynamos and motors	i
Law Battery Co., open circuit batteries	i
Lombard Water-Wheel Governor Co	xviii
Okonite Co., insulated wire	i, xviii
Partridge Carbon Company, motor and generator brushes	i
Phœnix Glass Co., globes and shades	i
Rhode Island Tool Co	xviii
Safety Insulated Wire and Cable Co	i
Standard Underground Cable Co	i
Stirling Co., water tube boilers	xviii
U. S. Telephone Construction Co., "M. & B." telephones	i
Western Telephone Construction Co., telephones	xvii
Weston Engine Co., engines	i

INSIDE PAGES.

Allen, L. B., soldering sticks	xii
American Bell Telephone Co	xv
American Electric Telephone Co., long-distant telephones	xv
Baillard, E. V	xi
Bain, Forée, engineer	110
Baker & Co., platinum	xv
Baxter, H. E., & Co., electrical supplies	x
Beacon Lamp Co., incandescent lamps	111
Belden Machine Co., drop forging	xii
Benjamin, Geo. H., patents	xiv
Berliner Telephone Co	xv
Bickford & Francis Belting Co., leather	xvi
Boynton Multivolt Battery Co	112
Bradbury-Stone Electric Storage Co., storage batteries	xi
Brill, J. G., Co., railway cars	xiii
Brixey, W. R., Day's kerite wires and cables	x
Brush Electric Co., arc lamps	vi
Cash Buyer's Union, bicycles	xiv
Central Electric Co., incandescent light supplies	iii
Chapman Valve Mfg. Co	v
Chisholm, A., & Co., commutator compound	xi
Colgate Company, Geo. L., lightning arrester	112
Columbia Incandescent Lamp Co	ix
Connecticut Pipe Mfg. Co	vi
Consolidated Telegraph and News Co	111
Crefeld Electrical Works, telephone cables	xii
Crocker-Wheeler Electric Co	111
Cutter Electrical and Mfg. Co	xvi
Darlington, F. W., consulting engineer	xvi
De Veau & Co., telephones	xi
Dixon, Jos., Crucible Co., belt dressing	xiii
Dudley Electric Manufacturing Company, individual telephone signal	xiv
Duval, W. S., Jr., patents	110
Dyer & Driscoll, patent solicitors	110
Eddy Electric Mfg. Co., Eddy generators	xiii
Electric Launch Co	xvi
Empire China Works, porcelain specialties	xv
Eppenger & Russell Co., Valentine subway electrical conduit	iii
Euler, H. C., mother-of-pearl	112
Faraday Carbon Co., carbons	112
Fleming, W. H., woven wire dynamo brushes	xi
Forest City Electric Works, commutator bars	viii
Fort Wayne Electric Corporation, "Wood" ammeters	vii
Garlock Packing Co	viii
Globe Electric Construction Co., general contractors	xvi
Globe Electric Light Co., incandescent lamps	vi
Globe Metal Works, refiners of platinum	viii
Harrisburg Foundry & Machine Co., Harrisburg ideal engines	v
Hooven, Owens & Rentschler Co., electric railway and electric light engines	iii
Huebel & Manger, table push	viii
Independent Electric Co., fuse wire	xii
International Correspondence Schools	viii
Lane & Bodley, street railway engines	iv
Lehigh Valley Creosoting Co., creosoted lumber	112
Lozier, H. A. & Co., Cleveland bicycles	viii
Marshall, Wm., condensers	viii
McIntire, The C., Co., connectors and terminals	112
Metropolitan Chandelier and Electric Supply Works	112
Metropolitan Telephone and Telegraph Co	xiv
Moore, Alfred F., insulated electric wire	xv
Morris, Tasker & Co., poles and tubes	xii
National Telephone Mfg. Co., telephones	xv
New England Engineering Co	xiii
New Haven Car Register Co	iv
New York Belting and Packing Co., rubber belts	iv
New York & Ohio Co., Packard lamps	viii
Ostrander & Co., W. B., supplies	112
Partrick & Carter Co., electrical supplies for housework	112
Pemsel, Friedr., electric light and battery carbons	iii
Penberthy Injector Co	xvi
Pennsylvania Street Railway Association meeting	viii
Philadelphia Telephone Co, Blake transmitter	xiv
Phillips Insulated Wire Co., wire	111
Pope Manufacturing Co., Columbia bicycle	viii
Position Wanted	112
Read, Robt. H., patents	110
Replogle Governor Works	111
Royce & Mareau, electrical supplies	xi
Safety Car Heating and Lighting Co., Pintsch system	x
Sanger, M. E., & Co., experimental and model works	xii
Scott Electric Lamp Co	viii
Self-Winding Clock Co., clocks	xvi
Shaw, Harry M., lightning arresters	xiii
Shipp, Jordan & Co., carbons	x
S. K. C. Electric Co	viii
Smith, Jas., Woolen Machinery Co	xvi
Solar Carbon and Mfg. Co., carbon specialties	xvi
Southgate, W. B., & Co., selling agents	viii
Standard Electric Co., arc lighting	xii
Standard Thermometer Co., arc lamps	xiii
Stanley & Patterson, electrical supplies	vi
Stevens, H. L. C., photo-engraving	iv
Stucky & Heck Electric Manufacturing Co	xvi
Syracuse Storage Battery Co	xiv
Thayer Electric Co., electrical engineers	xvi
Varley Duplex Magnet Co., magnets	xiv
Wanted Specialty	112
Washington Carbon Co., Helios carbons	iii
Waterman, Chas. H., arc lamps	xiv
Western Electric Co., supplies	x
Westinghouse Electric & Mfg. Co., Shallenberger meters	v
Weston Electrical Instrument Co., measuring instruments	x
White-Crosby Co., contracting engineers	xi
Wilkinson, W. H., automatic wiping device	xii
Worthington, H. L., electric signs, etc	iv
Zogg, Nicholas	xi

It is reported that a Welsbach light company is to be formed in Mexico. Will the promoters of the company kindly inform the investing public how many gas burners there are in Mexico.

Whatever scientific value may have been contained in the World's Fair incandescent lamp tests is now of no use. The tests are out of date. Was there any good reason for delaying the announcement of the results?

We look for a considerable development in the manufacture and sale of electric heating and cooking apparatus during the next six months. The great advantages possessed by electrical apparatus of this kind are the strongest incentives to its economical and commercial perfection.

Complaints have been made that the Niagara Falls Power Company will not admit casual visitors to its power house at Niagara Falls. We can see no ground for criticism here. Aside from the possible danger to ignorant visitors, the company has the usual right to refuse any and every one an opportunity to inspect its private property.

It is hoped that every American manufacturer of electric railway apparatus and supplies will endeavor to make as fine an exhibit as possible at the exposition which will be held during the meeting of the American Street Railway Association at Montreal next October. There will be a large attendance of delegates and visitors, and the opportunity and facilities for a first-class exhibition are unusually favorable.

In this issue of the ELECTRICAL REVIEW will be found the first instalment of an interesting and valuable article by Dr. J. Mount Bleyer on a means of artificial respiration invented by him. The value of artificial respiration, especially after apparently lethal shocks of electricity, has already been demonstrated. Anything which will add to our knowledge of the subject possesses the great value which always attaches to means for saving life.

If the Victor Electrical Company, Cuyahoga Building, Cleveland, Ohio, obtains its "bargains" in electrical supplies in the same way it secures matter for its monthly house organ, it is not a proper firm for the trade to do business with. The August number of its organ, which poses as a legitimate monthly, contains matter stolen bodily from the ELECTRICAL REVIEW. This is the second time we have given this company a free advertisement for the same reason. The next one, perhaps, will be in a different form and will show the value of the copyright law.

WALL STREET AND THE ELECTRICAL STOCK MARKET.

The market of the week was extremely dull and professional. This was due to the disinclination of monied interests to make any further move pending the final outcome of the exchange situation. The exports of gold this week aggregated $4,300,000. The great bulk was taken in the middle of the week. The appearance of security bills in the latter days was the cause of the dwindling shipments. This was construed as favorable by the market and resulted in limited covering. The crop report, it appears, had been discounted before its publication. The market is pronounced by good judges to be ripe for a further appreciation just as soon as the gold movement stops, or when it appears certain that the syndicate will be able to maintain the Treasury reserve. Crops have improved within the week without any set back, and business conditions are better than they were a week ago.

General Electric was the center of interest in the electrical group. Quite a pronounced movement in the stock occurred, based upon knowledge of a resumption of negotiations with Westinghouse. When it was learned that these had a third time failed, the stock relapsed to about its opening figure. I am told that the prospects of a revival are very remote.

The Westinghouse side of the story appears to be that General Electric was not willing to make concessions in the matter of patent litigation and an equitable distribution of the business. General Electric, it is understood, regards Westinghouse's request for a cessation of litigation without any offsetting compensation as unreasonable. Moreover, Westinghouse asks for a bigger slice of the business than it has been having. It is stated in the electrical field that this latter company, owing to the equipment of its new works, has capacity decidedly in excess of its orders. That it should seek to build up a business is only natural, and it is not surprising that General Electric should object to helping it out in this respect. The failure of the two companies to come together necessarily means a continuation of the cut-throat competition on certain lines of goods. Withal it will be a good thing for consumers.

The suspicion that the importance of the deal between Westinghouse and the Baldwin Locomotive Works has been emphasized at least for all it is worth is beginning to grow in Wall street. Just how that electrical company can profit by having its castings made at one end of the great State of Pennsylvania and the finishing done at the other is a problem which is now puzzling speculators. Those who attach great importance to the arrangement say that the greater advantage lies in the influence of the Baldwin works in securing electrical business for Westinghouse. The prestige commanded by this company in the car equipment field is very enviable and it stands to reason that it will command considerable busi-

ness. The arrangement is undoubtedly a preparation to meet the development which is sure to take place in the next 10 years in the application of electricity to steam lines, which is confidently expected to be as great or even greater than that of the past decade in its application to horse roads.

I am told that the Manhattan contract for electrically equipping the Manhattan Elevated line is not destined to play such an important part in the electrical field as was first popularly supposed. The company has not yet decided what system to adopt and it may be months before a selection is made. After this a trial plant will be established and added to year by year, until in the course of five or six years the entire system is equipped. This will enable the company to wear out its valuable rolling stock, using the money which it would appropriate for renewals for the purchase of electrical equipment.

Considerable light was thrown on Manhattan's position in the New York transit field on Thursday by the publication of its earnings for the quarter which permit the deduction that for the 12 months ending June 30 it has not earned the 6 per cent paid on the stock. The amount returned was 5.07 per cent against 7.77 per cent in 1894 and 9.90 per cent in 1893. This heavy falling off is largely due to the competition from the Columbus avenue cable line and the loss of traffic resulting from the transfer system in connection with this line as well as others of the Metropolitan system. It is a fair deduction that when the Lenox and Lexington avenues lines are in full running order further heavy reductions will be made upon earnings. There can ultimately be but one or two results from these causes. The Manhattan company must in some form co-operate with the Metropolitan Traction or it must improve its service to a point which will render it inviting to the traveling public. Electricity, it is believed, will be very potent in bringing about this last mentioned result.

The stock of the Edison Electric Illuminating of New York was very quiet, recording quotations at 99 and 99¼. The bonds sold quite freely at 109½ for the 1sts. There were several sales of the consolidated 5's at 103¼. The stock of the Brooklyn Edison company recorded quotations at 106 and 106½. The bonds sold at 114¼. The company returned net earnings for July of $15,433 after providing $3,541 for interest. The amount applicable to dividends is $11,891. This is an increase of $6,377.

On the Boston Exchange, Bell Telephone improved materially in a week, advancing 2½ per cent to 200. The course of the other telephone stocks was also upward. Erie gained 2 to 58 and New England 1 to 89. The course of Electric Storage Battery is upward, recovering its reaction of the latter part of last week and touching 45 on Friday. Westinghouse common was quoted at 26 to 26¾ and the preferred 54 to 54½.

BAIN.

New York, August 17, 1895.

BRIBE TAKING AND GIVING.

A LITTLE MORE ABOUT THIS PERNICIOUS PRACTICE.

That the efforts of the ELECTRICAL REVIEW to clear the electrical field of "sand-baggers," two-sided commissionites and others of the same ilk are appreciated is shown by the letters we have recently received. The following is selected as an example of the general character of these letters:

TO THE EDITOR OF ELECTRICAL REVIEW:

I take much pleasure in congratulating you upon your editorial, "What is there in it for me?" in a recent issue of the ELECTRICAL REVIEW. You have struck the keynote that should be constantly sounded until the disreputable practice of engineers receiving commissions is entirely driven out of the profession. A great service will be performed toward the entire fraternity if the editors of the other technical journals will join with you in your effort to purify the business.

When an engineer is employed either in a consulting or supervising capacity, he must necessarily protect the interests of his client and his compensation should be sufficient for the service rendered; it is too often the case that the client expects competent and expensive engineering service for a very small remuneration, and thus causes the engineer to look elsewhere for what may be considered only a reasonable compensation for his services.

I have known of instances where clients have stated to engineers that they would pay the engineer so much for his services and that he was at liberty to secure whatever commissions he could from parties selling apparatus and equipment. This course does not tend to honest business practice. An engineer must always fail in his effort to serve two masters. I could give you many instances of the way in which temptation is offered to the engineer and how much strength of character and consistency of purpose is required to resist the temptation, particularly when honest men have a growing conviction in these days that honesty means comparatively small financial success.

I hope that you will follow this matter up and that you will receive encouragement from other sources. I trust that you will find a sufficient number of gentlemen who have the same interest in the advance of the electrical and mechanical engineering profession as myself who will encourage you in the step you have taken. I remain, yours very sincerely,

ENGINEER.

New York, August 10, 1895.

The ELECTRICAL REVIEW has accumulated considerable matter bearing on the subject of bribe taking and giving, which, if published, will certainly have an unlooked for effect in high quarters. For the benefit of those who wish to protect themselves as far as possible from the "sand-bagger," we give below several experiences, suppressing the names, dates and places for the present.

A man who had been trusted by his employer to make his purchases of goods found himself a little short of ready money and decided that the easiest way to get it was to "sand-bag" some manufacturer from whom he had been buying. He went to a manufacturer named Smith and stated that he wanted 100,000 of certain goods which he had formerly purchased in 10,000 lots. Mr. Smith asked him why he was buying so heavily, as the goods might be out of date before the 100,000 could be sold. The buyer replied that he had been purchasing goods from Mr. Smith for some time, that the house he represented was gilt-edged and that he thought it was time there was "something in it for him." He was willing to buy 100,000 of the goods now if a commission of so much (naming a figure) could be paid in cash. Mr. Smith was surprised, but politely told the buyer that he didn't do business that way and that he would go to the trouble of informing his (the buyer's) employer what kind of a man he had as a purchasing agent. He did so and the buyer lost his job.

Another case was that of an electric railway contractor who was asked to bid on some new construction work. The contractor knew that the chief engineer of the road had the deciding opinion in the matter and from conversations with him discovered that securing the contract was merely secondary to securing the chief engineer. The contractor accordingly prepared his bid which amounted to $16,000. He went to the chief engineer's office, pulled a chair up beside him, and drawing out a slip of paper, wrote on it "$16,000." Then he pushed it toward the chief engineer, saying, "Mr. Sanders, I think we can do the work for that figure." Sanders looked at the slip and said, "I think it would be more satisfactory if you could do it for——" and then he held up the same slip of paper on which, under the contractor's figures, he had written "$18,000." The contractor thus discovered that the price of the chief engineer was $2,000. He bought a little hand-bag, put $2,000 in bills in the bag and had a boy deliver bag and contents to Sanders, who subsequently awarded him the contract.

A case in which the biter was bitten happened in a city not a hundred miles from New York. Contracts for work amounting to over $300,000 were to be let and all the electrical contractors knew that the first thing to be done was to "see" the chief engineer. A New Yorker, Kelly we'll call him, heard of the work and immediately took a train to ———. He had the chief engineer, Jones, dine at his hotel with him. After several small bottles and other large ones, Kelly said to Jones:

"Old man, I want this work. Tell me what to bid."

Jones went through motions and intimations until he discovered from Kelly that "there was $50,000 in it for him." Then he told Kelly to bid $312,000.

Kelly returned to New York and told his partners how he had "cinched" a big contract. The bids were opened soon after this and Kelly thought he'd take a run over to ——— just to see the disappointment of the other fellows. The first bid opened was for $314,000, and Kelly smiled knowingly. Next came Kelly's bid of $312,000, and finally the third and last bid was opened. It was for $310,000, and was submitted by Mr. Crane, who also carried on his business in ———. Kelly realized that he had got the "double cross," and being possessed of considerable sporting blood, took his medicine philosophically.

On his way out of the room an angry man approached Kelly and said: "D——n that red-headed, blankety-blank engineer! He threw me down."

"That so?" asked Kelly. "How did he do it?"

"Why," replied the other, "I offered him $25,000 if he'd tell me how much to bid to get the contract. He told me a bid of $314,000 would get the work."

"That must have been before he saw me," answered Kelly. "He told me to bid $312,000, and I was to give him $50,000. We've both been done up, my friend. I wonder what the contract cost Crane?"

Kelly and the angry man kept their eyes and ears open for the next few weeks, and finally learned the sequel of the story.

One day Jones walked into Crane's office and asked for a private interview. When they were alone Jones remarked nonchalantly:

"I've got some obligations to meet to-day and I'm a little short. I'd like to get about twenty-five thousand."

"Twenty-five thousand what?" inquired Crane, looking surprised.

"Dollars," said Jones.

"Twenty-five thousand dollars! For what?" gasped Crane, in well-feigned astonishment.

"Why, on account of my commission. You certainly remember promising me $100,000 if I told you what bid would get that contract."

"Are you trying to blackmail me?" asked Crane, threateningly. "I'll report you to your board of directors. Get out! You don't get a cent."

But Crane didn't report Jones and the latter had to swallow his defeat. It didn't cure him of "sand-bagging," however. But the rest is another story.

A Balloon Electric Sign.

The crowds which throng the vicinity of Herald square, New York city, at night may be seen with their eyes elevated heavenward gazing at a single word of living fire which oscillates slowly to and fro high above the house tops and apparently floats unsupported in the air. The word is "Sapolio" and the sign is a transparency filled with incandescent electric lights supplied with current through cables from a source on the ground. The sign is hung from a captive balloon and the lighting cables are carried up the rope which anchors the balloon. On a dark night the balloon is practically invisible and the weird effect produced on the observer by seeing the sign apparently unsupported causes comment which attains the desired result—advertising.

This novel scheme might be used to advantage by electric railway companies which own Summer resorts. A sign of this kind floating over a resort should prove attractive.

TELEPHONE NEWS AND COMMENT.

The Standard Telephone Company claims to have secured over 200 subscribers at Trenton, N. J.

The Western Union Telephone Company, capital stock, $100,000, has been incorporated in Chicago. Its promoters say it will furnish telephones at $30 per year.

The Elgin City Railway Company, Elgin, Ill., have closed a contract with the Western Telephone Construction Company, Chicago, to furnish apparatus for a private telephone system.

The Lansing Telephone Exchange Company, of Lansing, Mich., have contracted for 400-telephone capacity exchange, complete, with the Western Telephone Construction Company, Chicago.

It is reported that the Sultan of Turkey, who has been opposed to the introduction of electricity into his domain, has at last consented to the erection of a telephone line between Stamboul and Sofia.

The Western Telephone Construction Company, Chicago, have been awarded the contract by the Altoona Phœnix Telephone Company to furnish complete apparatus for a telephone exchange at that point.

Barnesville, Ohio, has fallen in line with Newark, Mt. Vernon and Chillicothe, and has contracted with the Western Telephone Construction Company, Chicago, also for complete apparatus for telephone exchange.

Wapakoneta, Ohio, will have a new telephone exchange within a short time. The Wapakoneta Telephone Company have already contracted for the apparatus which will be furnished by the Western Telephone Construction Company, Chicago.

Following are the officers of the Dirigo Telephone Company, of Maine: President, Hon. George M. Seiders, of Portland; treasurer and secretary, Fred V. Chase; general manager, Seth E. Beedy; directors, Hon. George W. Seiders, Adam Leighton, of Portland; Hon. A. R. Savage, of Auburn; Hon. William Engel, Eugene M. Hersey, of Bangor; C. E. Mare, F. H. Russell, John J. Linscott, S. E. Beedy, of Farmington.

There is considerable activity in telephone matters throughout Iowa. The managers of the new home company at Boone have been in Jefferson within a few days negotiating with Mr. Cockerill with a view to arranging for the construction of a line between these two towns. The Boone company proposes to build a line to Ogden; Mr. Cockerill to Grand Junction, and the two companies to meet half way between these two points and operate the lines jointly.

The American Bell Telepone Company on August 9 filed in the United States Circuit Court at Boston a bill of complaint against Wilfred Thompson and others, of Boston, doing business under the name of the Bay State Telephone Company, for infringement of the Berliner patent. The Bell company also filed a bill of complaint against the Century Telephone Company and others doing business in Boston for the same cause Injunctions are asked for and subpœnas are returnable September 3.

Boston Duck Company's Electrical Installation.

As the advantages attendant upon the introduction of electricity into textile mills are being brought home to manufacturers by a study of the benefits already derived by other mills in which the electric motor has gained a stand, the number of plants is daily increasing. One of the latest converts to the new method is the Boston Duck Company, of Bondsville, Mass., the mills of which are now operated partly by water and partly by steam. From the water they are able to derive about 600 horse-power over their present steam plant, consisting of two 250 horse-power engines, one being run condensing and furnishing power alone, the other non-condensing and being used partly for power and partly to furnish exhaust steam to the dye houses. The dye houses, however, require the exhaust steam from about only 100 horse-power. Thus, if the power were not required in the mill to help out the water-wheels, the condensing engine could be shut down entirely and the other engine could be run at about half its capacity only.

Three thousand feet below the mill, this company owns another water privilege on a difference in level of 22 feet. This was developed some years ago, and the company even went to the expense of building a foundation for a mill before they decided to give up the project. Since that time electricity has come upon the scene and the heretofore unutilized water-power has now become of considerable value. Wheels are to be set up in the unused mill and 500 horse-power is to be transmitted back to the mills at present in operation at Bondsville. This will enable them to dispense almost entirely with their present steam plant.

The General Electric Company have undertaken to install the necessary electrical apparatus for this plant. It will consist of one three-phase 400-kilowatt 900-volt generator and one synchronous motor of similar size which will develop 485 horse-power on its pulley. The loss in the line has been calculated at about three per cent only. In estimating the economy effected by the introduction of electricity, the Boston Duck Company have announced that they will not count the cost of the development of the second water-power made in 1880, when calculating the operating expenses of the complete plant, as the money put out for the hydraulic improvements cannot be recovered and will not therefore be counted in as part of the present development.

PERSONAL.

Mr. Henry A. Reed, of the Bishop Gutta-Percha Company, is enjoying a well deserved two weeks' rest in the mountains.

Captain W. L. Candee is now known as the Commodore, having chartered a fine sloop yacht on which he will live for a few weeks during the heated term.

Mr. E. T. Gilliland, the eminent telephone inventor and manufacturer, is enjoying a respite from labor in his laboratory by a visit of a few days with his family on his Mudiania Island, a charmingly isolated spot near Rockaway Beach, where weak fish and crabs are found in quantities and bite with enthusiasm.

Mr. A. H. Patterson, manager of the Phœnix Glass Company, is enjoying his Summer vacation in the nicely upholstered sleeping cars, the increase of the business of the Phœnix company requiring much traveling. Mr. Patterson has opened a beautiful ornamental lamp department at his New York house, 42 Murray street, where fine effects are secured by aid of the incandescent lamp.

Mr. J. H. Rhotehamel, president of the Columbia Lamp Company, of St. Louis, is spending a few weeks in the East. At Nantasket Beach last week Mr. Rhotehamel, who is a strong swimmer, was instrumental in saving the lives of a lady and gentleman who got beyond their depths. The rescue was a courageous one, and Mr. Rhotehamel received many compliments for his brave act.

Mr. Megargee, president of the International League of Press Clubs, has called a meeting to arrange for a special train to be run from New York to Atlanta, arriving on November 13, which is League Day at the Cotton States and International Exposition. The invitation was tendered in behalf of the exposition by ex-President Clark Howell, editor of the *Atlanta Constitution*, and Mr. H. H. Cabaniss, manager of the *Atlanta Journal*, and Mrs. Loulie M. Gordon, representative at large for the woman's department.

Commissioner Thomas L. Hamilton took his first lesson on August 9 as a member of the New York Board of Electrical Control. He sat in the board and took a thinking part, while Mayor Strong, Commissioners Hess and Kearney showed him how business was conducted. By the secretary's report it was shown that 600 poles and 1,146 miles of wire had been removed since January 1. A committee was appointed to investigate the complaint of several telegraph and electric companies of a lack of ducts on Sixth avenue.

A Nice Arc Lamp Order.

Mr. Charles I. Hills, New York manager for the Perkins Electric Switch Manufacturing Company, of Hartford, Conn., last week closed an order for 50 Waterhouse ornamental arc lamps with M. C. Spencer & Company, who will open a new dry goods store in 125th street near Seventh avenue, New York city.

Electricity in Powder Mills.

The introduction of electricity in the operation of powder mills has recently become somewhat extensive. It has been found that electric motors can be so placed that they are nowhere near dangerous points and that they are considerably more convenient to handle than any other method yet devised. The American Powder Company, at South Acton, Mass., have contracted for the building of a three-phase power plant, consisting of two 75-kilowatt 550-volt generators, and eight 20 horse-power, one 10 horse-power and three 5 horse-power induction motors all wound for similar voltage. The generators are to be driven by a combination of steam and water-power. Water wheels driving from 100 to 150 horse-power and an engine supplying whatever may be required in excess of the capacity of the wheels up to 150 or 200 horse-power. The motors will be placed at distances of about 800 feet to 2,600 feet from the generators, the line being practically continuous in one direction. The majority will be placed in a group at about 800 to 1,200 feet from the generator, the rest of the motors being extended along the line to the maximum distance.

The motors will be housed in small brick buildings built for and adjacent to each powder mill, there being in no case more than one motor to a mill. These mills are all quite small, as each step in the powder making process is carried on in a different mill. The main shafting of each mill extends outside the mill proper and to this shafting the motors will be belted, running at an average speed of 110 to 120 revolutions. It will thus be seen that there is no motion in any mill except that necessary for the manufacture of powder. The equipment of these mills is directly due to the success which has attended the operation of two other mills of this company located in the West, which are operated by continuous motors and generators.

Montreal Street Railway Convention.

There will be an exhibition of electrical apparatus in conjunction with the next meeting of the American Street Railway Association at Montreal, P. Q., on October 15 and lasting four days. The exhibition will be held in the Victoria skating rank, just in the rear of the Windsor Hotel, which will be association headquarters. The exhibits will include electric railway apparatus and supplies of all kinds and current will be supplied for running the active exhibits. It is desired to have as many moving exhibits as possible. Every precaution will be taken to prevent fire or any damage to apparatus, and watchmen will be on duty both day and night. Manufacturers are requested to assist in making this the finest exhibition of street railway apparatus ever held, and they will be accorded every facility for doing so. Full particulars may be obtained from Mr. Stonewall Jackson, local secretary, 17 St. Sacrament street, Montreal, Que.

Electrical Exhibits At The Cotton States and International Exposition.

The Electrical and the Machinery buildings at the Cotton States Exposition must be taken as a joint feature, says a special correspondent of the New York *Evening Post*. As the development of electricity depends so greatly upon mechanical power, it is impossible to separate the two in a display without injustice to the one or the other. In the electricity building itself there will be, to all intents, a still exhibition. All kinds of apparatus and highly improved parts of apparatus will be displayed there by the General Electric, the Westinghouse, and 10 other companies, but few things in separate operation. Probably the most active single exhibit will be that of the Bell Telephone Company, which will have rigged up a complete miniature exchange, illustrating at once the factory and hotel system, the city system, and the village system, and in which both the magneto and the Law appliances will be used. About 75 instruments will be scattered over the fair grounds, so that visitors who desire further practical tests may communicate with any of the buildings or with the city of Atlanta, or by long-distance wire with any other place where the company has a station. The company hopes, by its popular explanation and illustration of the switchboard process, to mollify the impatience of some of its patrons, who insist upon what it deems an impracticable perfection of service.

As with the telephone, so with various other electrical apparatus. The management have thought it at once more economical and more satisfactory to make the exhibit serve useful purpose in the promotion of the exposition as a whole; and accordingly the largest and finest electrical machinery will be set up among the engines in the machinery building, and furnish lights and mechanical power to all parts of the grounds at the same time that it is open for study as an exhibit.

The great mechanical system centering in the machinery building will include:

A general electric monocycle machine of 350 horse-power, connected with 2,200 incandescent lights and 75 arc lights, and furnishing 120 horse-power besides. It will be driven by a Lane & Bodley 22x48-inch Corliss engine of the Columbian type.

Two Westinghouse direct-connected alternating machines of 120 kilowatts capacity each. These will be driven by Westinghouse engines and will furnish 2,300 incandescent lights, besides 100 horse-power.

A Fort Wayne Electric Corporation 160-kilowatt alternator, direct-connected with a Harrisburg ideal tandem compound engine. This will operate 1,800 incandescent lamps. There will be another alternator of 150 kilowatts capacity—make and type not yet determined—exclusively for lighting the amusement terrace on the south side of the grounds. Also, for the same purpose, two more arc machines, of 60 lights each, will be driven by a Houston, Stanwood & Gamble engine.

Two Brush machines of 125 lights capacity each, one driven by a straight-line engine and one by an Erie City Iron Works engine.

One Fort Wayne Electric Corporation 125-light machine, driven by an American engine.

Two Siemens & Halske 100-kilowatt machines and one Jenney machine of 200 horse-power, both of 500 volts. Both will be driven by a Buckeye four-cylinder compound engine.

One 150-kilowatt Edison bi-polar generator, driven by a Frick automatic engine which will be used for fountain lights and for charging electric launches.

One 35-kilowatt Card generator, direct-connected to a Lane & Bodley cross-compound vertical engine of 115 volts.

One Westinghouse multipolar direct-current machine, to run 350 lights at 125 volts, driven by a Westinghouse engine.

The line shafting will be driven by a Frick company 22x48-inch engine, by rope transmission furnished by the Dodge Manufacturing Company of Mishawaka, Ind., who also will supply the line shafting.

The steam machinery will be attached to eight boilers, all the work of the Stirling company, of Chicago. Two of them will be 350 horse-power and six of 250.

Street Railway Association of the State of New York.

Mr. G. Tracy Rogers, of Binghamton, N. Y., president of the Street Railway Association of the State of New York, announces that the next convention will be held at Albany on September 17, 1895. A determined effort will be made to make the forthcoming meeting one of great interest and instruction. Concise papers upon pertinent subjects, such as care of equipment, control of cars, instruction of motormen, promotion of travel and other subjects of equal importance, will be prepared by practical street car men. A question box will be opened, followed by brief discussions upon the subjects contained therein.

This association has already demonstrated its value and benefit to the street railway interests of the State and it is most desirable to have these influences developed to the utmost. An increased membership is the first step toward such an end. With this idea in mind, the association has decided to admit to membership companies in villages and smaller towns at the nominal cost of five dollars membership fee and five dollars annual dues. The regular annual dues for companies whose gross receipts aggregate $.00,000 or over is $50.

The report of the last annual meeting, held at Syracuse, has been published and distributed to members.

Open trailers are now running on the Lenox avenue underground conduit road in New York city.

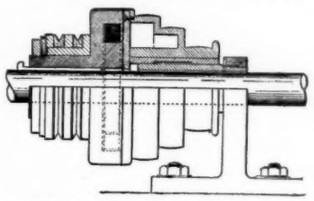
The Use of Two or Three Motors On Electric Cars or Locomotives.

[*By P. Hoho in "L'Éclairage Électrique."*]

In practice it is sometimes found necessary to employ two or more motors on an electric locomotive. The author shows that this use of more than one motor on a locomotive or train not only reduces the efficiency, but has also other serious disadvantages.

In every case each motor either drives one or two axles. If R_1 and R_2 be the total rolling friction, and Q_1 and Q_2 the friction due to slipping, for the first and second motors respectively, although at some moments these quantities may be equal, at others they will differ very widely, depending on the distribution of the load, and on variations in the nature of the track.

The case is first considered in which the two motors are coupled in series. The force exerted on the periphery of the armature is K I H. K is a constant, I the strength of current and H is the strength of the magnetic field; these values being equal



THE HOLDEN MAGNETIC CLUTCH.

in the two motors. If the resistances to be overcome by the two motors be equal, then $K\,I\,H = R_1 + R_2$; but if $R_1 < R_2$, then the first motor will tend to run faster and the second one to run slower. But the speed of the two motors must be the same, as they are mechanically coupled. The resistances offered to the two motors will then become

$$R_1' = R_2' \frac{R_1 + R_2}{2} - K\,I\,H.$$

This will produce slipping in the driving gear or between rails and wheels.

Under these conditions one motor will be taking nearly the whole E.M.F.—$E = (R + 2r)\,I$—and spending its energy on overcoming the resistances due to slipping. E = total E.M.F., r = resistance of each motor, R = resistance outside the motor.

It is therefore evident that two or three motors of N H.P. would give less useful power than one motor of $2n$ or $3n$ H.P.; and it has been found in actual practice that under certain conditions the use of two motors, instead of one of twice the output, decreased the efficiency by 60 per cent. It has been assumed above that the fields of the two motors are equal, which is, however, not strictly so in practice; and this would still further reduce the efficiency.

When the two motors are coupled in parallel they then become more independent of one another. To overcome the resistance R_1 and R_2, the motor will take currents $K_1 H_1 I_1 = R_1$, and $K_2 H_2 I_2 = R_2$. The speeds of the motors will tend to differ according to the values of R_1 and R_2. But, as these must necessarily be the same, the two motors will therefore exert the same force, and the resistance to be overcome will be divided between the two motors—

$$R_1' = R_2' = \frac{R_1 + R_2}{2}.$$

This result is the same as when the motors are coupled in series, but the causes in the two cases are just opposite. When the motors are compound wound they then combine the advantages and disadvantages of both systems.

The author concludes by remarking that the use of two or more motors on a locomotive or train offers great disadvantages with regard to slipping. If in some cases it is necessary, from practical considerations, to divide the power between two or more motors, these should then be coupled in parallel.

The Holden Magnetic Clutch.

The accompanying illustration represents a magnetic clutch devised by Major Holden, and which has been found to be a great convenience at Woolwich Arsenal, where it has been tried practically for some time past, says the London *Electrician*. Now that the advantages of electrical transmission of power in workshops in place of heavy belting and gearing have been recognized, the field for magnetic clutches is likely to become a wide one, as the most economical results will probably be obtained from a motor of fair size driving a short line of countershaft from which the various machines are run. A clutch of the size represented is capable of transmitting at 350 revolutions three horse-power in regular work, the expenditure of electrical energy during the time that the clutch is in action being less than 20 watts. Simple forms of switch have been devised for starting and stopping, one form being similar to the arrangement in ordinary use with fast and loose pulleys, where pulling one cord starts, and the other stops, the machine, and another form which is actuated by one cord only, the switch being put on and off by alternate pulls of the cord. Messrs. Drake and Gorham are joint patentees with Major Holden.

Wagner Company Sued For Infringement.

The Wagner Electric Manufacturing Company, of St. Louis, Mo., have been sued for alleged infringement on patented improvements in induction coils by Carl Zipernowsky, Maximilian Deri and Otto Titus Blathy. The Westinghouse Electric and Manufacturing Company has also brought suit against the Wagner concern for alleged infringement of a method of secondary distribution.

Tokio, Japan, has six telephone exchanges; Osaka three, and Yokohama and Kobe two each. The cost to subscribers is about $45 a year.

ELECTRIC STREET LIGHTING.

ABSTRACT OF A PAPER READ BEFORE THE NORTHWESTERN ELECTRICAL ASSOCIATION, CHICAGO, JULY 17, 1895, BY GEORGE CUTTER.

In considering a question like that of lighting streets, alleys and public squares, we should first define the results to be produced by the lighting system, as the time has gone by when the whole object of our enterprising cities and towns in electric street lighting was to produce a sensation in the way of brilliant effects. This sentiment was all right a few years ago and was characteristic of our American push and enterprise, but to-day the question is not one of show, but of best illumination. After defining what we mean by best illumination we can then study each system to see how nearly it accomplishes the theoretical results and at the same time presents the fewest practical objections.

It appears to me quite simple to define theoretically perfect lighting, but it is not as easy to decide which system gives results nearest to the theoretical; local conditions affect this question more or less. A general uniform illumination of mild intensity, such as that of a dark cloudy day or possibly that of a clear night with a full moon, is the theoretical condition to be produced by artificial lighting. This is especially the case after bed-time.

There is an illumination better than either of these two for our study to reproduce artificially, and that is a clear night in Winter in extreme northern latitudes. That is, the midnight light of the land a little south of the midnight sun. When we can produce this general uniform illumination of mild intensity most desirable in a town gone to sleep, we will then have the best night illumination. And the rivalry which has led to the use of brilliant effects with really poor practical illumination will be replaced by attempts to produce the best approach to this theoretical condition, and the glare which blinds a man for half a block with accompanying inability to see for the next half block will become obsolete.

But this mild illumination, while it may be best for the outlying or residence districts during all hours of the night, is not sufficient for the business center during the earlier hours of the evening. So for proper results we must produce a brilliant illumination of this business center until bed-time, and for the sake of economy we must then change the down-town illumination to the same mild intensity that serves for the residence districts earlier in the evening.

We, in America, are not accustomed to figuring on any definite illumination as expressed in candle-power, but can easily estimate that illumination of a dark, cloudy day or of a moonlight night which we want to reproduce as nearly as possible. There is one important factor in street lighting which might modify our practice in regard to the best general illumination. It is the police duty of the light in preventing crime and in facilitating the capture of criminals.

But even for this duty a uniform illumination of mild intensity is likely to prove best, because the eye, which is adjusted to a bright light, cannot distinguish objects in a dull light. So the thief or burglar would work with safety in a dark corner, when a few bright spots are used as the lighting system, whereas, the same corner with the same intensity of light would be a risky place to work in when the street lighting system gave a general illumination of mild intensity which would be free of the bad effects of great contrasts of light and shade.

For the same reason, dark alleys should be avoided even at the sacrifice of a uniform arrangement of our lights. There are various points to be considered when we come to the practical side of the question and try to determine what system will give the best approach to the theoretical results with the fewest practical objections. Among those points I might mention a few of the most important: 1. We should consider the means of distribution to produce the nearest to our theoretical conditions; that is, we should aim to procure a uniformity of light even of mild intensity in preference to a few extra bright spots with intervening dark spots. Briefly stated another way, avoid great contrasts of illumination. An exception can be made as before indicated for the business section before bed-time, a brilliant illumination of this section in the early part of the night changing to correspond with the rest of the city for the rest of the night.

2. Reliability of service of the lighting system, since it loses its effectiveness either as a pathfinder or as a safeguard unless it is perfectly reliable.

3. Steadiness of illumination is another point closely connected in importance to the one just mentioned, and in the same line of thought, viz., that of avoiding contrasts in illumination either in different localities or at different times.

Determining the last two points brings us to the fourth, necessary skill of all labor and ease of procuring same, the employment of home talent to the greatest extent possible being usually advisable. If the installation and operation of our plant requires special skill, then absence of this skill might cause bad service or even total cessation of light. Many a street lighting system has fallen short merely by disregarding this point.

Then there is a durability of the apparatus, together with ease and economy of replacing used-up parts. In considering this we must look out for both the probability of permanency of the supply of duplicate parts and the amount of attention to keep all in good working shape. After careful judging of the closely related points thus far enumerated we can well give attention to the 6th: Efficiency of conversion from coal pile to light.

My only comment on this point is that I place it second in importance to that of general uniform illumination, as high efficiency can well be set aside for the other more desirable feature of uniformity considerations of this point of efficiency lead to the seventh, total operating expenses, the importance of which depends almost entirely upon local conditions. As also the eighth point, cost of necessary plant for producing the light.

This leads to the ninth: Appearance of fixtures on streets and squares, and on this point more attention should be given than is the usual practice. It is not right to have line wires hanging loosely about our streets, the lights arranged along a straight street in a zig-zag fashion and a general appearance of carelessness throughout the whole work. It costs but little extra attention, and practically no extra expense, to have the lights in a line, the wires straight, fixtures level or plumb as the case may demand. We have means at hand for the installing of arc or incandescent street lights so as to present an attractive appearance. The repair account in a trim and neat plant is always less than in a neglected one. All the help and all the citizens respect the fixtures in proportion to their appearance. What is more, a large share of the opposition to overhead wiring would never have been raised if it had not been for the bungling work which is so common.

General Electric Company to Stay in Schenectady.

It was announced on August 15 that the General Electric Company would retain its shops in Schenectady, N. Y., instead of removing them to Camden, N. J., or some other place, as has been lately rumored. The commission appointed to appraise the property abutting on Kruesi avenue, which street must be closed to give the company additional room required, has finished its work and gave fair values for the property, the whole parcel amounting to about $56,000. The street will be closed almost immediately and the General Electric Company will proceed to erect new buildings at a cost of $200,000. It is understood that at least 1,000 more hands will be employed by October 1, making 5,000 in all. The Lynn works and the Harrison, N. J., works are to be brought to Schenectady, it is said, and ultimately 8,000 hands will be employed.

The Wilkesbarre, Pa., Electric Light Company, for whom Mr. J. H. Vail is acting as supervising engineer, has awarded the following contracts: Boilers, 900 horse-power, Stirling Boiler Company; engines, 400 horse-power, Armington & Sims engines, E. P. Hampson & Company, general agents; shafting and friction clutch pulleys, Falls Rivet and Machine Company, Cuyahoga Falls, Ohio; heaters, Warren, Webster & Company, Philadelphia, Pa.

Westinghouse-General Electric.

Mr. George Westinghouse, Jr., gave out the following statement to the press at Pittsburgh on August 13:

"Three months ago Mr. Twombly, a director of the General Electric Company, had asked me if the Westinghouse company would be willing to exchange patent licenses upon a basis which would terminate the costly litigation between the two companies.

"Mr. Twombly was informed that the Westinghouse company would enter into a general exchange of licenses, and a memorandum was drawn and committees were appointed by the parties to discuss an agreement upon the lines of such memorandum. No meetings of those committees were held, for reasons which only the General Electric officials can explain. It is said to have been due to irreconcilable differences among themselves."

Mr. Westinghouse went on to state that after some delay further offers and negotiations were made and committees were appointed for both companies. These committees met in New York on August 6, 7 and 8, Charles A. Coffin, president of the General Electric Company, being one of its committee. An agreement was apparently reached, but this was afterward receded from by the General Electric Company. They afterward asked for 30 to 60 days to reconsider the subject.

Then the Westinghouse company declined to go further, believing that the negotiations had already been used in Wall street for stockjobbing purposes. The suggestion made that the companies had agreed upon prices and a division of territory was erroneous, Mr. Westinghouse said.

The Boston *News Bureau*, on August 14, quoted a gentleman prominently identified with General Electric Company as intimating that the position of the Westinghouse company will have to be materially altered before there can be any hope of an alliance of interests. He made the further important statement that he had been given assurance that the General Electric Company could, if it so desired, make almost the same arrangement with the Baldwin Locomotive Works as Mr. Westinghouse has made in all essential features.

Westinghouse-Baldwin Alliance to Have a Competitor?

A press report last week rumored that the Siemens & Halske Electric Company, of America, had formed a combination with the Yerkes interests in Chicago to oppose the recently formed Westinghouse-Baldwin Alliance. The Yerkes interests comprise the Widener-Elkins syndicate, controlling important street car lines in New York, Philadelphia, Pittsburgh and Chicago. A short time ago the Siemens & Halske Company purchased the plant of the Grant Locomotive Works in Cicero, Ill., and at the same time the capital of the Siemens & Halske company was increased from $1,000,000 to $2,000,000.

HINTS ON THE MAINTENANCE OF ELECTRIC RAILWAY CARS.

BY TITO TOSCANI.

We will take, for instance, a system of railroad that covers a large city and consequently has a number of car houses, with a central car house for the heavier repairs which it is not expedient to have done at the different car houses. In the first place we will have each shop designated by a letter of the alphabet; the division of our repairs will be known by numbers as below:

1. Trolleys.	Nos. 1 to 9, Motors and Electrical Parts.
2. Circuits.	
3. Controlling mechanism.	
4. Armatures and fields.	
5. Brushes and brushholders.	
6. Gears, pinions and cases.	
7. Brasses.	
8. Grease, oil and waste.	
9. General overhauling.	
10. Shifting equipments.	
11. Wheels and axles.	Nos. 11 to 14, Trucks.
12. Brakes.	
13. Frames and boxes.	
14. Grease, oil and waste.	
15. General on bodies.	Nos. 16 and 17, Buildings.
16. General on buildings.	
17. Lighting circuit buildings.	
18. Tools.	Nos. 18 to 20, Miscellaneous.
19. Plows and sweepers.	
20. Life guards.	

You will see that by this system shop orders from the different divisions are readily classified; thus 4 B would refer to armatures and fields at B (whatever shop is designated by that letter). There can be a time card (see Fig. 1) which, by the use of the letters and figures, can be made small and handy to be carried in the pocket. Then, again, if a various number of equipments are used as on some roads, such as Westinghouse, General Electric and waterproof motors or controlling mechanisms, the initials of the equipment could be added; say, for instance, 4 B, Wh., would read armatures at "B shop," Westinghouse equipment. You can thus keep the cost of repairs per equipment of Westinghouse, General Electric and so on.

I know of one road which keeps its accounts similar to this and found that one equipment was costing them for motors 22 cents, material and labor, as against $2.49 on another equipment per month. The same can of course be applied to various makes of the other equipments such as tracks, cars, brakes, etc. A material slip (see Fig. 2) can be kept in the same manner, which should be kept by the foreman who has charge of the stock room and who must make his material balance. Instead of making a daily report of articles used, it can be kept by a monthly inventory of the articles classified under the heads of the 20 different divisions; add to this the material received during the month and deduct from the whole the inventory of the beginning of the next month. You will find that all the articles used can be classified under one of these divisions and not duplicated in any one of them, except, perhaps, in circuits of cars (No. 2) and circuits of buildings (No. 17), when the material used for building can be kept apart and deducted from that used for cars. If any other particular division is needed, it can, of course, take another number and so on *ad infinitum*. Fig. 3 is a stock card, which can be affixed to a bin or other convenient place and balanced whenever necessary.

Having given a description of how the men and foremen keep their cards, I will endeavor to show how they can easily be transferred to a set of books (Fig. 4). As a means of facilitating computations as charged to the different items and car houses each month, a book known as a scrap book can be kept. This book can be ruled both with 21 spaces or (as the case may be) ruled vertically, these corresponding to the 21 accounts into which maintenance is divided by 15 (or as the case may be) horizontal spaces separated by lines running across the vertical lines. The squares thus cut off can be about one inch square. In these squares are kept the daily, weekly or monthly amounts, each square corresponding to a particular item of maintenance and belonging to a particular shop. At the end of the month each square is added up. The total of all the squares in a vertical line represents the total of the different items of maintenance and those horizontally representing items as confined to the particular shop or car houses. From this the totals can be transferred to a more compact book and a grand summary can be made of each shop under the other by which a comparison can be made at sight. Also in this latter book, the weeks or months can be tabulated for each shop, one under the other, so that any increase or decrease can be readily observed and acted upon, also added up at any time, giving the amounts to date. The cost per car mile can be kept per division or *in toto*.

FIG. 1.—SHOP CARD.

Shop Card. No. 5.

Form 801 A. Week Ending, August 10. Name, Jones.

1st Day.		2d Day.		3d Day.		4th Day.		5th Day.	
Job.	Hrs.	Job.	Hrs.	Job.	Hrs.	Job.	Hrs.	Job.	Hrs.
5 B.	5								
4 B. G. E.	2								
6 C.	3								
Totals.	10								

Foreman. Total Hours for Week.

FIG. 2.—MATERIAL SLIP.

.....Railroad Company. August..... 1895.

.....Shop. Daily Report.

Foreman.....

Job No.	Quantity.	Material.	Price.	Total.	
5 B. W. H.	100	Carbon Brushes.	2¢	$2	00

FIG. 3.—STOCK CARD.

Form 714-5 M. E.

.....Railroad Company.

Stock Card.

Stock Entered.

Carbon Brushes Material.

Stock Issued.

8/4 100	8/8 100	8/12 50	8/16 200	20	50	30	10	50	100		

FIG. 4.—SCRAP BOOK.

August, 1895.	1	2	3	4	5	6	Etc.	Totals.
A	$12.40 9.30			$7.50 3.50				$32.70
B			$6.50 3.30 4.40					14.20
C						$5.00 2.21 3.00 2 31 6.70		19.22
D								
Etc.								
Totals.	$21.70		$14.20	$11.00		$19.22		$66.12

LITERARY.

Journal of the United States Artillery for July, 1885, has been received.

G. T. Evans & Company, electrical contractors, Pittsburgh, Pa., have issued a handy table for computing weights, losses, etc., of copper wire.

The University of Nebraska, Lincoln, Neb., has issued a very interesting illustrated circular giving in detail the courses in the department of electrical and steam engineering.

"Experiments With a New Polarizing Photo-Chronograph, Applied to the Measurement of the Velocity of Projectiles," by Drs. Albert Cushing Crehore and George Owen Squier has been received.

The Southern Magazine and its successor, *The Mid-Continent Magazine*, which circulated especially in the Southern States and was perhaps the chief literary medium of the South, will cease publication with the August issue, and its subscription list and "goodwill" have been made over to *Scribner's Magazine*.

ELECTRICAL PATENTS

ISSUED AUGUST 6, 1895.

544,157 Trolley wheel; J. Conway, Baltimore, Md.—Has a central annular groove and two side flanges, each of said flanges, one on each side of the central groove, having on its inner side a continuous spiral groove to direct the line wire from the flange to the central groove.

544,180 Machine for making battery plates; T. T. Lewis, Philadelphia, Pa.

544,198 Electric railway; F. Taylar, Charlotte, N. C.

544,209 Electric railway and tramway; J. Claret, Lyons, France.

544,224 Electric alarm clocks for tills; C. Helm, Indianapolis, Ind.—A till lock, constructed suitably, a rocking member carrying a pivoted latch operated by a series of tumblers or wards, a latch-plate pivoted to the rocking members and a contact plate with which the latch plate engages, together with an electric bell and battery.

544,236 Controlling switch for electric motors; W. J. Pohlman, Woodbrook, Md.

544,261 Alternating current motor; R. Lundell, Brooklyn, N. Y.—Has two inductive parts provided with independent windings, the windings of one part being closed upon themselves in short circuit and disposed at angles to the radial lines of the axis or core thereof.

544,266 Medical induction coil; J. Tatham, Philadelphia, Pa.

ISSUED AUGUST 13, 1895.

544,278 Electric rheostat; F. B. Badt, Chicago, Ill.—A glass plate having electrical resistance conductors embedded therein and extended from the plate at intervals for connection with the contact terminals of the rheostats and metallic plates, between which said glass plate is adapted to be clamped.

544,283 Conduit for electric conductors for railways; F. L. Capps, Newark, N J.—Pairs of separable arms having extensions carrying terminals adapted to be brought into electrical connection, a compressible protector covering said terminals.

541,289 System of electrical distribution; S. C. C. Currie, New York, N. Y.

544,306 Conductor for electric railways; P. C. Just, Chicago, Ill.

544,312 Trolley for underground electric railways; M. D. Law, Washington, D. C.—A traveling contact device embracing two trolley wheels or contact pieces moving in contact with the line conductor.

544,313 Traveling contact device for electric railways; J. C. Love, Philadelphia, Pa.—A trolley wheel having swiveled joints permitting movement of the trolley wheel about an axis transverse to the arm, a movement about an axis longitudinal of the arm.

544,318 Multiple fuse switch; J. Melzer, Austria-Hungary.—Comprises an insulated revoluble member, having recesses therein, a series of removable fuse-carriers placed in such recesses and set screws to hold such parts in assembled position.

544,329 Commutator connection for dynamo-electric machines; H. H. Wait, Chicago, Ill.—A connection box, conductors connecting the armature coils with the commutator segments, and inclosed in said box to protect the same from injury.

544,331 Globe netting for arc lamps; E. P. Warner, Chicago, Ill.—An upper and lower holder having a series of pins around which the wires are passed to form a removable netting.

544,332 Electro-magnetic damper for measuring instruments. 544,633 Combination dynamo; E. P. Warner, Chicago, Ill.

544,335 Telephone switch; F. R. Whitney, Lewiston, Me.

544,341 Multiple switchboard system; O. A. Bell, Brooklyn, N. Y.

544,345 544,346 544,347 544,348 Printing telegraph; C. L. Buckingham, New York, N. Y.—A distributer, a series of selecting relays and adjuster magnets controlled thereby, a restoring circuit, and a controlling relay for the latter in one of the distributer branches.

544,351 Relay; T. B. Dixon, Henderson, Ky.

544,358 Commutator brush-holder; G. J. Junker, Mount Vernon, Ill.—A brush-holder formed of a metal sleeve, an insulating sleeve mounted on the metal sleeve, a series of brush-holders mounted on the insulating sleeve, and a rod extending through the brush-holders but insulated therefrom.

544,361 Construction and method of operating dynamo-electric machines; F. H. Loveridge, Coldwater, Mich.

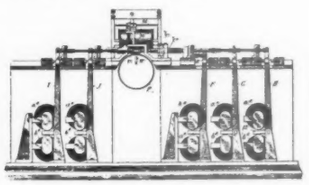
544,365 Synchronism indicator; R. D Mershon, Pittsburgh, Pa.—Comprises a coil in series with the two machines to be synchronized and a movable armature in inductive relation to said coil, the position of which indicates the relation of said electromotive forces.

544,368 Strong current arrester; F. R. McBerty, Downer's Grove, Ill.—A switch spring held under tension by a small quantity of fusible conducting material adapted to be fused by a heating coil.

544,369 Plug and cord for telephone switchboards; F. R. McBerty, Downer's Grove, Ill.—A conducting cord having a suitable covering, a sleeve within the covering and means for clamping upon the covering outside of the sleeve.

544,370 Automatic signaling device for telephone switchboards; F. R. McBerty, Downer's Grove, Ill.

544,372 Manufacture of electric cables; W. R. Patterson, Chicago, Ill.—Consists in spirally winding each wire with tape and after bunching the wires or twisting them in the opposite direction so as to partially untwist and thereby loosen the individual windings, forming air spaces.



No. 544,348.—PRINTING TELEGRAPH.

544,373 Art of drying electric cables; W. R. Patterson, Chicago, Ill.—Consists in placing a core in a sheath or chamber passing through the conductors of the core, a current of electricity sufficient to heat same, to vaporize the moisture without carbonizing the insulation, and at the same time maintaining a vacuum in the chamber.

544,374 Art of drying cores of electric cables; W. R. Patterson, Chicago, Ill.

544,383 Electric grounding switch; C. E. Scribner, Chicago, Ill.—A grounding switch provided with a lever or spring having a hood placed above the contacts of said switch to protect the same from dust.

544,384 Single cord grounded circuit system for multiple switchboards. 544,385 Test signal for multiple switchboards. 544,386 Telephone switchboard apparatus. 544,387 Electro magnetic signal; C. E. Scribner, Chicago, Ill.—A solenoid or helix, two bars or strips of soft iron extending through the opening or bore of the helix, and an annunciator target adapted to be displayed by the relative movement of said strips.

544,388 Telephone exchange system; C. E. Scribner, Chicago, Ill.

544,391 Electric railway conduit system; L. H. Sherwood, Mount Vernon, N. Y.

544,396 Winding of dynamo-electric machines or motors; E. Thomson, Swampscott, Mass.—A laminated core provided with projecting iron extensions between the coils, and having each single coil or circuit which generates or utilizes an alternating impulse, divided and interspersed between projections that occupy different positions around the structure.

544,419 Electric wire containing hat or cap band; A. M. Rodriguez, Brooklyn, N. Y., and E. D. Rockwell, Bristol, Conn.—A hat or cap band, provided with terminals for the application and removal of an electric lamp, and the application and removal of wires bringing an electric current to the band and hence the lamp.

544,430 Support for electrical batteries used on vehicles; T. Froggat, London, Eng.

544,436 Automatic safety appliance for electric conductors; A. E. Hutchins, Detroit, Mich.

544,471 Trolley wheel and bearing; E. Verstraeter, St. Louis, Mo.

544,501 Cleat for holding electric wires; E. W. Buffington, Fall River, Mass.

544,502 Support for incandescent lights; C. A. Carmany, Middletown, Pa.—Consists of a block having slotted supports and carrying a shaft with a drum and plates having corresponding slots.

544,514 Electric gas-lighter; E. Orling, Stockholm, Sweden.

544,529 Electric arc lamp; R. H. Cunningham, Richmond, Va.

544,530 Apparatus for insulating wire. 544,531 Insulated electric conductor; T. N. Hallinger, Chicago, Ill.—A cable formed of conductors having spirally wound tape of a tube-like form and leaving an air space about conductors.

544,545 Signal apparatus for telephone exchanges. 544,546 Apparatus for telephone exchanges; J. J. O'Connell, Chicago, Ill.

544,552 Electro-therapeutic appliance; J. E. Wiles, Milwaukee, Wis.

544,567 Electrical signaling apparatus; W. W. Dean, St. Louis, Mo.

544,578 544,579 Electric arc lamp; J. J. Haines, New York, N. Y.—A carbon-carrier in the form of a reciprocating non-rotating screw, a nut free to rotate on said screw, a movable support on which said nut rests and a detent carried by said support and engaging said nut to hold it from rotation and adapted to release it when a feed of the carbon is required.

544,610 Process and apparatus for extracting ores by electrolysis; E. W. Clark, Butte, Montana.

544,634 Electric lighting attachment for gas burners; F. A. Webb, Beverly, Mass.—A bunsen gas burner having gas and air supplies and a mixing chamber connected to such supplies, a stationary insulated electrode and a movable yielding electrode both arranged within said mixing chamber.

544,644 Fountain ink rollers for telegraph registers. 544,645 Ink roller for telegraph registers; C. A. Rolfe, Chicago, Ill.

CLEVELAND, OHIO, August 21, 1895.

NOTICE—Sealed proposals will be received at the office of the clerk of the Board of Control, No. 105 City Hall, Cleveland, Ohio, until 12 o'clock M., August 31, 1895, for furnishing and putting up in place 20 police boxes, fitted ready for telephones; also one 4-circuit desk or switchboard, with all the necessary devices to be used in connection with the above boxes; also one 8 inch gong indicator for the patrol station, No. 5, on Swiss street; all the above to be furnished and set up ready for the main lines, together with the necessary batteries.

Each proposal must contain the full name of the party or parties making the same, and all persons interested therein, and must be accompanied by a bond of two thousand ($2,000) dollars of some disinterested person or persons, resident of Cuyahoga County, or a certified check on a solvent bank in the city, as surety that if the proposal be accepted a contract will be entered into.

The city reserves the right to reject any or all bids. E. A. ABBOTT,
Director of Police.

PATENTS.

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PATENTS

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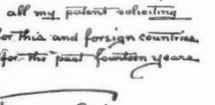
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Armature Windings of Electric Machines

By H. F. PARSHALL,

Consulting Designing Engineer of the General Electric Company; Member of American Society of Mechanical Engineers, and American Institute Electrical Engineers,

— AND —

H. M. HOBART, S. B.

The treatise discusses exhaustively the principles governing the arrangement of armature conductors of electrical machines, both continuous and alternating current, including various multiphase windings applicable in practice.

The plan of each chapter is—first, a general discussion of the properties of the windings treated, the explanation of the formulas applicable, illustrated by diagrams showing each useful form of winding. The treatment is so complete that windings can be designed from the information given in the chapters, but in addition to this there are given 60 tables showing exactly how, with a given number of conductors, the windings have to be arranged for a given result. These tables eliminate the necessity for special calculations, so that those uncertain in the use of figures may be able to design armature windings with accuracy.

CONTENTS.

CHAPTER I.—Single-Wound Gramme Rings.
" II.—Double-Wound Gramme Rings.
" III.—Two-Circuit, Single-Wound Multipolar Rings.
" IV.—Two-Circuit, Multiple-Wound Multipolar Rings.
" V.—Bipolar Drum Windings.
" VI.—Multiple-Circuit, Single-Wound Multipolar Drums.
" VII.—Multiple-Circuit, Multiple-Wound Multipolar Drums.
" VIII.—Two-Circuit, Single-Wound Drums.
" IX.—Interpolation of Commutator Segments.
" X.—Two-Circuit, Multiple-Wound Drum Armatures.
" XI.—Rules and Tables Continuous Current Windings.
" XII.—Single-Phase, Alternating Current Windings.
" XIII.—Quarter-Phase, Alternating Current Windings.
" XIV.—Three-Phase, Alternating Current Windings.

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The Capacity of Electrolytic Condensers.

The accompanying illustrations refer to an article under this heading published on pages 91 and 92 of the ELECTRICAL REVIEW for August 14, 1895. Figs. 1 and 2 represent graphically the two forms of condensers used in the experiments which the article describes. The variation of the capacity of a cell is shown by the curve in Fig. 3. By plotting two

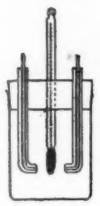

FIG. 1.

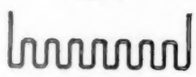

FIG. 2.

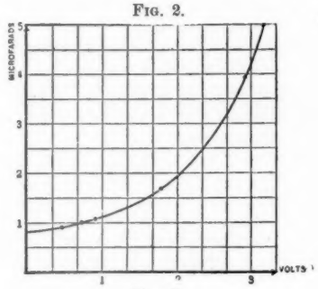

FIG. 3.

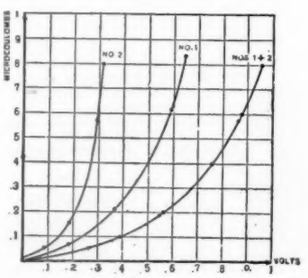

FIG. 4.

curves with microcoulombs for ordinates and volts for abscissæ as shown in Fig. 4, the voltages of polarization produced in each cell by the passage of different quantities are determined. The dissipation of charge in two instances is shown in Figs. 5 and 6.

Wanted—Capital to Develop a Water-Power.

TO THE EDITOR OF ELECTRICAL REVIEW:

Can you advise me where I can find capitalists whom I can interest in an electric railway site? I have one of the finest sites in the country in view with splendid water-power midway of the road and I think it can be bought cheap.

Yours truly,

INQUIRER.

Everett, Pa., August 14.

Bicycle Headlight.

TO THE EDITOR OF ELECTRICAL REVIEW:

Allow me to thank you for the favorable notice which you gave our search-light in your issue of July 24. We met with some disappointment in not being able to adapt a battery to our use, but we are now experimenting with a dynamo to generate electricity from the wheel of a bicycle or vehicle.

Thanking you again for your kindness, I am,

Yours very truly,

E. D. ROCKWELL.

August 14, 1895.

Cutter Electrical and Manufacturing Company Assigns.

Mr. Henry B. Cutter, president of the Cutter Electrical and Manufacturing Company, of Philadelphia, issued the following circular under date of August 15:

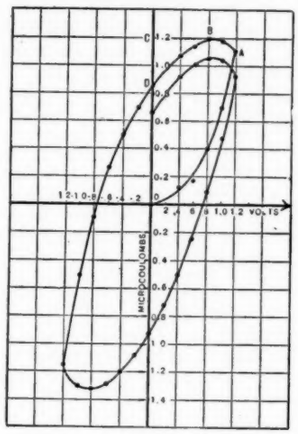

FIG. 5.

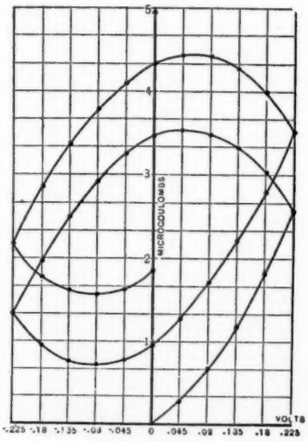

FIG. 6.

One of our creditors having issued a writ of foreign attachment against us, we have been compelled for the equal protection of our creditors to make an assignment.

We are at present engaged in preparing a statement of our affairs, and a meeting of creditors will be called at the earliest date possible, of which you will be notified, when a full explanation will be made.

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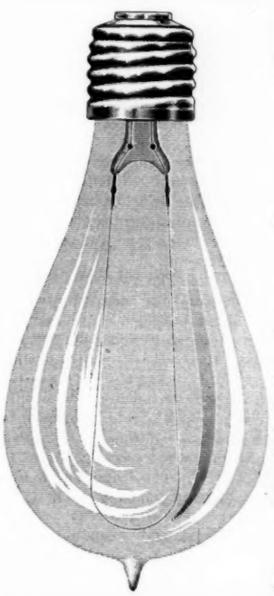

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ST. LOUIS ELECT'L SUPPLY CO., ST. LOUIS, MO.
BRADFORD BELTING CO., CINCINNATI, O.
PHILLIPS INSULATED WIRE CO.,
NEW YORK OFFICE: 39 & 41 Cortlandt Street.
FACTORY: PAWTUCKET, R. I.

MARK A. REPLOGLE, Chief Engineer.

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FIRE.
The destruction of our Works by fire on April 7th was almost complete.
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ADVANCE INFORMATION.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies, new telephone companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week.

New Electric Railways.

LANCASTER, PA.—The Pennsylvania Traction Company have asked for three charters. One of the charters is for the Philadelphia, Lancaster & Harrisburg Railroad Company, with a capital of $6,000,000. The charter members are as follows: John J. Patterson, J. Hay Brown, John D. Skiles, J. Gust. Zook, Michael Reilly, M. L. Herr, Henry Yeagley, S. H. Reynolds and H. C. Hopkins. Of the other two charters one is for the Lititz & Manheim Railroad Company, with a capital of $50,000, and the other for the Lancaster, Ephrata & Reading Railroad Company, with a capital of $70,000. For both of these the applicants are John J. Patterson, J. Hay Brown, John D. Skiles, J. Gust. Zook, Michael Reilly, M. L. Herr and Henry Yeagley.

OTTAWA, ILL.—Application has been made for a receiver to take charge of the Ottawa Electric Railroad for the benefit of the bondholders.

CLEVELAND, OHIO.—The Scenic Railway Company has been incorporated by J. B. Hanna, George G. Mulhern, E. W. Radder and others. Capital stock, $15,000.

PITTSBURG, KAS.—The Kansas & Missouri Railway Company has been incorporated by Samuel Barrett, Robert Bobbin and others to construct an electric railway line in Crawford county. Capital stock, $25,000.

NEW ORLEANS, LA.—The Chalmette Railway Company has been organized with Henry P. Beauregard, president; R. Bueros, vice-president; J. D. Alexander, secretary; for the purpose of building an electric railway six miles in length in St. Bernard Parish.

SACRAMENTO, CAL.—The Fair Oaks & Orangeville Railway Company has been incorporated by L. T. Hatfield, Capt. T. B. Hall and others for the purpose of building an electric railway between this city and Orangeville. Capital stock, $500,000.

FORT MADISON, IA.—The Fort Madison Street Railway Company closed the contract for the electrical plant of their works to the Electrical Installation Company, of Chicago.

AKRON, OHIO.—The Akron & Cuyahoga Falls Rapid Transit Company to-day purchased the plant of the Barberton Lighting Company for $30,000. It will be enlarged and, besides furnishing light, will be used as a power house.

MILFORD, MASS.—It is understood that the new street railway company is negotiating with the Milford & Hopedale company for the purchase of its franchise, power house, etc.

NIAGARA FALLS, N. Y.—The project to build an aerial railway at this place is likely to be carried out soon. It will be operated by electricity.

GORHAM, ME.—The Portland Extension Railroad Company has been incorporated by W. M. Davis, of Portland, and William Wheeler, of Brooklyn, for the purpose of building an electric road from Westbrook to this place.

HEARNE, TEX.—R. P. Duncan and others may build an electric street railroad in the suburbs.

MEXIA, TEX.—W. L. Hall will give information concerning company being organized to build an electric railway.

FALL RIVER, MASS.—Fall River Street Railway Company has been incorporated by Wendel E. Turner, Arnold B. Sanford, David Beattie, J. E. Osborn and others. Capital stock, $50,000.

WESTBROOK, ME.—A company is being organized to extend the Portland street railroad from Westbrook to Gorham.

WOONSOCKET, R. I.—The Woonsocket Street Railway Company will extend the street car tracks to Manville.

CHARLESTON, VA.—It is reported that a Northern Syndicate contemplates building an electric line from Kanawha Falls to Point Pleasant.

PITTSBURGH, PA.—The Consolidated Traction Company has been incorporated by C. Magee, George W. Elkins and others. Capital stock, $15 000,000.

STONEHAM, MASS.—The Mystic Valley Street Railway Company has organized with a board of seven directors, to build an electric railway from Stoneham to Arlington via Winchester. Capital stock, $65,000.

JENKINTOWN, PA.—The Jenkintown & Fox Chase Railway Company has been incorporated by Charles H. Noble, Howard Fleck and others, to operate from Greenwood avenue and York street to Fox Chase. Capital stock, $20,000.

AUGUSTA, GA.—The Augusta Railway Company will extend its trolley system to Lake Olmstead, which will be built at once by the company.

MEXIA, TEXAS.—Charles R. Penguilley is forming a company which contemplates building an electric road from Mexia to Tehucacana, six miles.

BALTIMORE, MD.—A committee has been appointed to secure right of way for the proposed electric line to Wetherville and Frankintown in the suburbs. T. H. Juhlk, president of the People's Bank, is interested.

OCALA, FLA.—It is reported that $6,000 worth of bonds to aid in building the Ocala & Silver Springs electric road have been taken. Address J. K. Martin.

BALTIMORE, MD.—The Pikersville, Reisterstown & Emory Grove Electric Company contemplate building a branch to Chattolanee Springs. Director of the company is George R. Webb, Equitable Building.

WASHINGTON, D. C.—Anacostia & Potomac Railway Company, with Arthur E. Randal and others, will extend it to Congress Heights, and change the power to electric. H. A. Griswold, president, can be addressed.

Electric Light and Power.

CHICOPEE, MASS.—Daniel G. Canty has been awarded the contract for the erection of an electric light station here.

NEVADA, MO.—The electric light and street railway franchise for a term of 10 years was sold to the Nevada Electric Light Company.

MENASHA, WIS.—The contract for lighting the city has been let to the Citizens' Electric Light Company of Appleton.

NEW CASTLE, PA.—Hon. J. B. Findley, of Monongahela, has transferred his controlling interest in the New Castle Arc Light Works, the incandescent plant, and the New Castle Artificial Gas Company to J. S. Hayes, who was chief electrical engineer to Andrew Carnegie, and to Robert Peebles, of this city.

KAWEAH, CAL.—Kaweah Irrigation and Power Company has been incorporated; capital stock, $300,000. Directors: Elisha C. Ware, Chicago; A. G. Wishon, Tulare; George Hanna, John A. Pirtle, Los Angeles; O. C. Ainsworth, Pasadena.

WASHINGTON, D. C.—A contract has been made with the Westinghouse Electric Company to furnish a new electric lighting plant for the House and Senate wings of the capitol, at a cost not to exceed $35,000.

SEATTLE, WASH.—Seattle & Snoqualmie Power Company has been incorporated; capital, $1,000,000. Trustees, William McCord, Henry G. Plummer, Lawrence L. Moore.

CONNERSVILLE, IND.—Connersville Electric Light Company has been incorporated by G. W. Ansted, William Newkirk, J. B. McFarland and J. M. Herron. Capital stock, $15,000.

VISALIA, CAL.—The Keweah Irrigation and Power Company has been incorporated by Elisha C. Ware, of Chicago, Ill.; A. G. Wishon, of Tulare, Ill.; George Hanna, of Los Angeles, and O. C. Ainsworth, of Pasadena. Work will be commenced immediately. The central point of the contemplated improvements is to be well-equipped with an electric power plant, capable of supplying 3,000 horse-power. Capital stock, $300,000.

NEW BETHLEHEM, PA.—The New Bethlehem Electric Company has been incorporated by G. S. Thomas, C. E. Andrews, M. H. Andrews and others, with a capital stock of $1,000.

MONTGOMERY, ALA. — The Montgomery Cotton Mills will put in an electric light plant, and are in the market for an electric light plant of 200 sixteen candle-power lights.

ROCKPORT, TEX.—The Rockport Light and Power Company will erect an electric light plant, and desire bids on an electric light plant to supply 1,500 consumers and light four miles of streets.

ELKHART, IND.—The Home Electric Light Company, A. H. Barron, manager, is purchasing new supplies. New machinery is being added.

ATTICA, IND.—Attica Power Company has been incorporated by C J. Haller, P. R. Zeigler, Will Zeigler, J. A. Wilson and others. Capital stock, $10,000.

SPRINGFIELD, MASS.—D. G. Canty has been awarded the contract for erecting an electric light station, at a cost not to exceed $16,500, by the Chicopee City government.

WANTED—SPECIALTY.

A business concern of 20 years' standing, situated in the machinery district in Boston, Mass., having more floor space than required for their special use, desires some additional specialty, on commission, or will allow room for displaying and storing machinery, with agents' quarters and our good will. Everything convenient. For particulars, address **BUSINESS, P. O. Box 2116, Boston, Mass.,** stating nature of business, etc.

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